Training Manual
on
Road Maintenance Management

CONTENTS

SECTION-1
(General Guidelines for Maintenance)

Fundamental Aspect

1.0 Introduction

The road transport network of any country plays a vital role in its economy and the physical condition of its road system is most crucial. Roads and road structures are an enormous national investment and require careful and timely maintenance to keep it in satisfactory condition. Without adequate and timely maintenance, road infrastructure deteriorates even with proper adherence to specified construction quality and material standards, which leads to higher vehicle operating costs, increased number of accidents and reduced reliability of transport services.

The Government of Bangladesh in association with 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 undertaken. Now the question of protection to the existing road network and keep it in good condition becomes paramount and often taking precedence over new construction. The Poverty Reduction Strategy Paper (PRSP) also highlighted the significant role of rural infrastructure in poverty alleviation of Bangladesh both directly and indirectly. There are many components of rural infrastructure of which three important elements are identified as - roads, markets and rural electrification, which have the comprehensive effect in poverty reduction. 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.

A well-trained work force is extremely important for a road organisation like LGED, whose prime responsibilities are construction, maintenance and management of Upazila Road and Union Road network of the whole country comprising of 78,000 Kms. roads. In LGED training to its relevant Engineering personnel in all aspect of road design, construction and maintenance is a regular event and its HRD unit pursuing this mission continuously following the well-coordinated yearly training calendar.

This manual provide a framework of the fundamental aspects of training for the development of an efficient and cost-effective maintenance management system that will optimise the economic benefits to be derived from the implementation of the massive maintenance programme undertaken every year throughout the country funded under the national revenue budget and other sources. This manual has been prepared for the use of all field-engineering personnel of LGED engaged in the implementation of the maintenance programme, to plan and undertake appropriate survey techniques to assess the actual maintenance need for road and road infrastructure and perform required maintenance operation.

This manual contains three sections: SECTION-1 contains the fundamental aspects of maintenance management, the SECTION-2 contains the various survey techniques and the SECTION-3 contains, which basically is the user guide of a customised computer software (RSDMS-V), dealing with the entry of above survey data, their analysis and relevant report generation.

2.0 Purpose of Maintenance

Maintenance reduces the rate of deterioration, it lowers the cost operating vehicles on the road by improving the running surface, and it keeps the road open on a continuous basis. It also includes the process of enhancing the environment of road itself, including the immediate surroundings. Maintenance should also be carried out to improve safety but, paradoxically, this is sometimes problematic as it can lead to speed, which in turn, results in number and severity of accidents.

Within this broad purpose, maintenance management can be assumed to have more detailed aims. These includes:

- The use of a systematic approach to decision making within a consistent and defined framework.
- To assess budget needs and resources requirements.
- To adapt consistent standards for maintenance and for the design of associated works.
- To allocates resources effectively.
- To review policies, standards and the effectiveness of programme on a regular basis.

From the experiences it has been seen that the cost of maintenance activities is very small when compared with other costs, nevertheless, the impacts on maintenance on other costs – vehicle operation cost, travel time cost, accidents cost and environment cost – can be significant. Similarly, the benefits in other areas can be substantial as a result of relatively small expenditure on road maintenance.

Maintenance covers a wide range of activities, many of which lack the 'glamour' associated with new works. As such, maintenance is not spectacular and, sometimes, its results do not have immediate impact. The long-term effects of maintenance are, however, significant. A key challenge for the road managers is to find ways in which to describe the problems and impacts of road maintenance that can be understood by politicians and general public. It is much more difficult to describe and define road conditions when maintenance intervention is necessary than to describe conditions resulting from new constructions.

2.1 Reducing Deterioration

Even with adequate maintenance, pavements will deteriorate over time. The rate of deterioration will depend on a number of factors including the traffic loading, the pavement strength, the climate and the environment. Eventually, the end of pavement's design life will be reached and there is a need for pavement rehabilitation or upgrading. These are normally relatively expensive activities and should, therefore, be postponed for as long as possible by carrying out effective and timely maintenance.

If the required cyclic and reactive maintenance (routine maintenance) are not carried out, drainage will become ineffective and surface defects will worsen, both of which result in water penetrating the structure of pavement. For paved roads, the resulting distress requires that a higher level of maintenance is needed prematurely. Failure to carry out resurfacing maintenance at the appropriate time soon leads to the need of strengthening overlay works, which is at least twice as expensive as resealing. If this overlay is not carried out soon enough, major deterioration sets in and pavement reconstruction will be required, which is at least three times more costly than an overlay. It will be seen that deferring works results in a rapid escalation of costs to the road administration.

The effect of axle loading and, in particular of overloaded vehicles, on the requirement of road maintenance is considerable. For example, a 10 tonne axle causes approximately 2.5 times as much deterioration to a pavement as an axle weighing 8 tonnes. It is clearly necessary, for road maintenance purposes, to know the value of the actual axle loading, since minor underestimates can shorten considerably the expected life of a pavement. However, enforcement of axle loading legislation is often difficult because the incentive system is biased: individual road users benefits from overloading at the expense of road user as a whole. Thus there is no incentive for individual users to comply with other than the threat of prosecution.

Considering the severe damage caused by the over-loaded vehicles, recently by a gazette notification Government has raised the existing single load limit from 8.2 tons to 10.0 tons and re-fixed the maximum permissible laden/train weight limit of motor vehicles higher than 20.0 tons and the maximum permissible weight for single axle and group of axles and also the maximum permissible laden/train weight of motor vehicles or combination of vehicles (rigid or articulated) for use in Bangladesh and so all pavement design should use the revised axle-load limit to better suit the actual loading trend in the country.

2.2 Lowering Vehicle Operating Costs

Cost savings obtained by deferring the need for reconstruction benefits vehicle operators who thereby avoid the high costs of operating on badly deteriorated pavements. The relative proportions of road administration costs and vehicle operating costs in the total lifetime transport cost associated with a road vary depending on the traffic level, as shown in the Figure 2.1. This figure is based on research carried out by the World Bank and relates to roads where optimal maintenance is undertaken. This shows that the relative proportion of vehicle operating cost rises from about 40 percent at 50 vehicles/day to about 90 percent at 1600 vehicles/day.

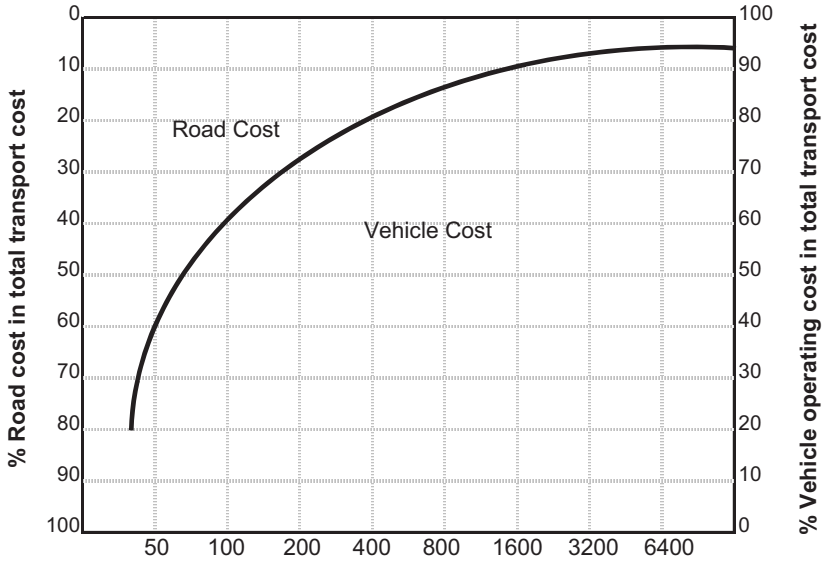


Figure 2.1: Relative proportions of road and vehicle costs in the total transport cost (Source: Schliesser and Bull, 1993)

A further example, shown in Figure 2.2, illustrates the effect of neglecting road maintenance. The figure shows the relative discounted lifecycle costs of construction, maintenance and vehicle operation under different maintenance spending scenarios. For a traffic level of 100 vehicles/day, a road in good condition will require about 2 percent of the total discounted costs to be spent on maintenance. However, if the maintenance funds are reduced, the pavement will start to crack and potholes will gradually appear. With this level of deterioration, vehicle-operating costs are likely to increase by about 15 percent. If there is complete neglect of maintenance, a paved road will eventually start to disintegrate, and annual vehicle operating costs will increase by about 50 percent.

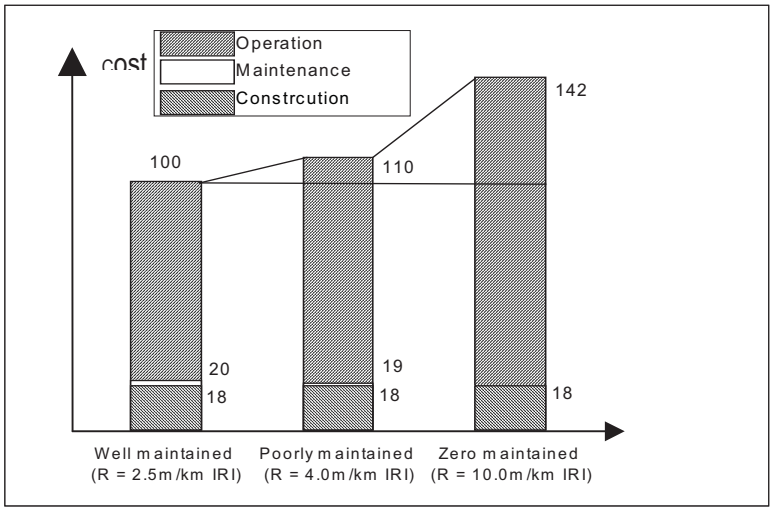


Figure 2.2: Change in discounted life cycle costs on a paved road for different levels of maintenance (Source: Robinson and Roberts, 1982)

2.3 Keeping the Road Open

The third reason for carrying out maintenance is to keep the road open continuously. Roads serve centres of population and industry and, if roads are closed, for whatever reason, then there are potentially serious social and economic consequences.

In case of rainy-season maintenance or flood management, many times immediate decisions need to be taken about where to cut the road to avoid huge losses at the up-stream side of the flood flow and alternative arrangements have to be made for limited traffic movement; once the flood-emergency is over quick restoration of the cut road stretches should be done.

2.4 Road Safety

Accidents have proved to be an inevitable result of road transport, and deaths and injuries are very tangible impacts of roads on the community. The factors contributing to safety are engineering, education and enforcement. In many countries including Bangladesh, the climate also has a significant impact. In this context, education aims at changing behaviour through publicity and raised awareness. While education and enforcement fall outside the scope this manual, it must be appreciated that all four factors interact, and that different combinations of factors are likely to have different impacts. A coordinated approach to safety should, therefore, be adopted at national, regional and local levels.

Road maintenance works can often provide an opportunity for making improvements to road safety by contributing to the engineering factors in the areas of:

- Pavement and footway
- Carriageway markings and delineation
- Signs, streetlights and road furniture.

The issues of 'black spot' analysis, remedial work design and layout, and traffic management measures should address adequately to improve the road safety concerns.

2.5 Environmental Issues

The condition of roads also affects the environment. This is important in all cases, and there is a growing public expectation for their surroundings to be managed properly. Roads in poor condition also lead to wasted non-renewable resources and contribute to air pollution from vehicles that are not operating efficiently. A further example is the need to consider the noise characteristics of different pavement treatments at the treatment selection stage, particularly in sensitive areas, such as those adjacent to hospitals or schools. Similarly, street lighting plays a vital role in crime prevention and safety of vulnerable groups. Particular problem also arise with chemical pollution in surface water running from roads. This may contain tyre detritus, diesel spillage, salts and other undesirable substances. Road drainage systems need to be designed to cope with such effluent.

3.0 Maintenance Categories

Roads are being lost or at least pavements are being lost, because they deteriorate into muddy, or dusty, or pot-holed dirt and gravel; silvers of asphalt among at the potholes betray many roads that were once sealed with asphalt concrete. Pavements are supposed to wear out: a bituminous pavement is designed to accumulate fatigue and to progressively lose its smoothness, despite routine and periodic maintenance. As bitumen oxidises, pavements become brittle and start to crack. At the early stage of cracking, a reseal will rejuvenate the surface and restore its elasticity. Once cracks are obvious, a reseal will no longer work: the cracks are too big and will come through the new seal, reappearing on the surface. Cracks let in water, which softens the road base and cause the road to break up. Rehabilitation restores it to its initial condition. Then the cycle repeats itself, so pavement wear off itself is not the problem, as it provides sufficient symptoms before causing real problem, but inadequate maintenance is the problem. Pavements should not wear out prematurely, nor they should be left so long that rehabilitation (overlay) no longer be of any use and they have to be

reconstructed. It is the failure to maintenance the roads that has cost very large sums.
Maintenance includes all activities needed to keep a road operating indefinitely. The two most commonly accepted maintenance categories are:

- **Routine Maintenance** – restoring drainage, filling potholes and cracks, maintaining edges of pavement on cyclic and reactive basis.
- **Periodic Maintenance** – these sort of maintenance activities usually undertaken at a regular interval of time and it is sub-divided into two sub-categories:
  - **Resealing** – regular resealing with a thin film of surfacing, about every 3 – 5 years, to rejuvenate the road surface.
  - **Overlaying** – periodic overlaying with a thick layer of surfacing to improve structural integrity, about every 08 – 12 years, to restore smoothness and durability.

Under special circumstances (mostly natural disasters), a special category can be included namely

- Emergency Maintenance – works undertaken to restore a breach on a road or to clear a road that has been blocked, for example, flood damage repair, road blockage clearance after a cyclone etc.

3.1 Routine Maintenance

Routine maintenance operations refer to the day-by-day activities that are carried out on a regular, largely repetitive basis. The nature and requirements for routine maintenance will depend on the importance of individual roads. The frequency may vary, in a particular season of the year the requirement may be high. Considering the nature and volume of damages, employing labour intensive method of working usually carries out routine maintenance operations. Proper attention will be given to allocate fund for this purpose. It is convenient from management point of view to consider routine maintenance under the two headings of cyclic and reactive works, as their management and planning are fundamentally different. Routine maintenance can further be categorized as: off-pavement maintenance, on-pavement maintenance, road safety and traffic-sign maintenance.

3.1.1 Off-Pavement Maintenance

This category dealing primarily with earthen shoulders, side slopes, roadside tree plantations, structures 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 included under this category.

This operation, out side the pavement are mainly labour intensive as well as being extremely cost effective and that has to be given more attention than the past. The important road network comprising all Upazila Road (paved and unpaved) and paved Union Road of each district must be brought under this category. Organised female labour group in the form of Labour Contracting Society (LCS) shall be assigned to carryout this task. Off-pavement maintenance will receive top priority over any other categories while allocating fund. Rural destitute women round the year shall maintain shoulders and side-slopes of all LGED sealed roads, immediately after construction.

3.1.2 Road Side Tree Plantation and Care-taking

Roadside tree plantation and care taking of the planted trees will have to be considered as an integral part of routine maintenance. In order 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 programme should normally be taken care under various road improvement projects of LGED. Preparation and implementation of such programme should follow the tree plantation manual of LGED published in April 2003. After completion of first phase of the plantation programme (plantation and it's intensive care taking), normal care taking of the roadside trees will come under off-pavement routine maintenance carried out by length-persons as usual. Those important roads where tree plantation has not yet been done

under any road improvement projects of LGED, routine maintenance fund from "Rural Road and Structure Maintenance Programme" under GoB revenue budget could be used for plantation and care taking in such cases. Besides, if the roadside trees of previous plantation project did not survive for whatever reason, 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 length-persons engaged for off-pavement maintenance. While new plantation or re-plantation (80 % or more plant died) schemes are taken, two length-persons – including additional one, per kilometre shall have to engage for the first year. These additional length-persons will be engaged for one year only on contract basis. Necessary provision shall have to be made in the scheme so that the relevant items are included in the estimate and could be implemented through Labour Contracting Society (LCS) involving the local community.

3.1.3 On-Pavement Maintenance

Routine maintenance of carriageways is very important to keep the road accessible throughout the year. The maintenance of carriageways of bituminous roads requires a higher level of technical competence and expertise compare to other classes of roads. Repair of small defects/damages on the pavement, which includes patching operations, require some technical training in the use of suitable materials, hand tools and appropriate items of mechanical equipment. Many of Upazila Roads in the rural area are bituminous surfaced roads and their maintenance is of high priority because they represent the most important routes of LGED's rural road network. It is particularly important that small surface defects are dealt with promptly; otherwise the cost of remedial work quickly escalates.

All paved rural roads shall have to be maintained on a regular basis by Mobile Maintenance Team (MMT) based at district level following the LCS mode of scheme implementation. One or more MMT could be constituted in each district considering the work volume and local condition. Each team will comprise of 3-5 skilled, semi-skilled and ordinary labourers. The team will be mobile and repair small damages like potholes, depressions, cracks, and edge distresses on the road pavement within a shortest possible time after the observance of damages. So that it would be possible to arrest further deterioration of the damaged spots. The defects observed in the road pavement must be recorded in the prescribed forms (Form: Rapid Road Condition Survey and Form: 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 should be provided to the labourers to prepare them as competent work force.

3.1.4 Road Safety and Traffic Sign Maintenance

Now-a-days road accidents are most common incidences frequently happening on the roads all over the country. The country has a current fatality rate of 76 deaths per 10,000 licensed motor vehicles, which is higher than most of the countries of Asia and Pacific. It is also noteworthy that fatalities and severe injuries sustained from road accidents are more than the minor injuries sustained from the same. Safety of road communication has become an issue of great concern needing urgent attention. The high fatality in road accidents in Bangladesh is caused by the deficiencies related to so-called three "E" factors of road safety, namely-Education, Engineering and Enforcement. These three categories of deficiencies require serious consideration and attention from all concerned party for an effective solution to this crucial problem of road safety.

Both fast and slow moving vehicles and the pedestrians are shearing the same road surface during its movement on it. So the pedestrians should move very carefully on the roads, otherwise there is every possibility that they might meet an accident. According to renowned Road Safety Specialists, accidents are normally happened at a particular location of the road. The personnel working with road management agency should identity those black spots and take the following steps

- Installation of appropriate signs and signals
- Identify technical fault and take necessary steps for rectification
- If the problem is not resolved locally, it should be referred to higher authority
- Aware the local people about the rules and regulations of road use

If the traffic signs/signals are installed correctly on the roads and they are followed properly the possibility of getting road accident will definitely be reduced to a great extent. 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, kilometre posts, informative, precautionary and compulsory posts, guide posts etc. in the planning and design stage of the project. In case of those rural 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 including informative, precautionary and compulsory posts, guide posts installed at appropriate locations on the road. Similarly, road identification posts showing road name shall have to be installed at the starting and ending chainage of each road already developed.

In order to ensure safety of rural roads and to prevent accidents on these 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/vegetation plantation; etc. must not be allowed on the road.

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

d) Superelevation should be provided on Sharp Bend, T-Junction and Crossing Point of the paved road with a minimum pavement width of 18 ft. Besides, steps should be taken to straighten the zigzag portion to maintain uninterrupted sight distance of the road.

e) Excavation of earth from slope and shoulder of the road embankment and also removal of turf will not be allowed, except in case of shoulder and side slope correction, where turf should be replanted after correction. Cattle should not be allowed for grazing on the road. Road surface should not be allowed to use as drying-yard for rice, jute, and other crops.

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

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

h) Signboards, inscribing road name, ID Number, LGED's ownership should be installed at the beginning and ending of roads. At the same time Kilometre-posts of standard size should also be installed at each kilometre.

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

All these activities enable the LGED to create employment opportunities for the rural poor and to create safer road to a great extent. To prevent road accidents through more safety-conscious planning, designing, construction and maintenance of roads, and improving hazardous locations using low-cost engineering measures Chief Engineer LGED’s circular dated 07.02.2005 should be followed. In addition to this effort, all Upazila Engineers should give regular accident report to Road Safety Unit of LGED HQ to maintain an accident database for further improvement of accident status on LGED roads by correction of black spots. For this purpose Maintenance Supervisors, working at the Union level, collect accident data in the prescribed format and report to Upazila Engineer on regular basis. The Upazila Engineer will input these accident data in RSDMS-V for on-ward transmission to district, region and HQ. Level.

4.0 Periodic Maintenance

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 and it will not mean re-construction of bituminous paved road. Periodic maintenance activities in case of bituminous road are again sub-categorised into:

(a) **Resealing**, and
(b) **Overlaying**.

(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 or structures and to restore them as far as possible to their original initial 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:
   i) Surface Dressing/Re-sealing (7mm/12mm seal coat),
   ii) Spot repair in combination with slurry sealing/sand sealing,
   iii) Single surface dressing.

(b) **Overlay**: This type of periodic maintenances are normally carried out at an interval of eight to twelve 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) Dense-graded asphalt overlay,
   ii) Spot improvement with bituminous carpeting (25mm/40mm/50mm dense or normal graded bituminous overlay).

Besides, other works relating to structures, Periodic Maintenance include – repointing 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.

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 more costly than that of labour-intensive routine maintenance operations. Periodic maintenance activities are normally carried out by employing local contractors using unit rate contract method.

4.1 Importance of Periodic Maintenance

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.

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.

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.

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

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 not less than 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 and this will extend life of the road.

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 paved Upazila Roads. The priority for periodic maintenance will be given based on actual traffic level on the roads. That means if a Union Road has higher traffic count compare to an Upazila Road, Union Road will get periodic maintenance first.

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 of the carriageway 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.

It is to mention that the structural strength of the pavement shall have to be considered 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

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 – 12 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.

Before taking up overlay on any road section the points must be checked first:

- Road segments must be rated 'poor' by most recent road condition/roughness survey.
- All spot improvements have been done on the road surface and of the carriageway are cambered properly.
- Assessment of pavement strength is done by Benkelman beam survey or any other suitable method and all necessary improvement of required road 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.

5.0 Emergency Maintenance

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

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 six months or immediately after periods of flooding or other natural disasters. A long stretch of well-maintained road in perfect condition could become useless, if a major structure mid-way along the road suddenly collapses, inevitably results in long delay in traffic movement, inconvenience and frustration among the road users.

All structures, large and small, should come under regular maintenance programme and the implementation of a routine inspection is essential for all structures. The Upazila Engineer or his nominated trained staff will perform this task regularly. The form for use in this connection should be the prescribed format and the collected data has to be entered through RSDMS-V. 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, spelling and disintegration.

Whenever the overall condition of a bridge/culvert, or of any component thereof, is described as "Critical", it should immediately receive the personal attention of the Upazila Engineer/XEN or other qualified and experienced engineer who should make a prompt decision as to whether it should be immediately closed or make restricted use in the interests of public safety. The planning and implementation of remedial works should then be put in hand as quickly as possible. From

2003-04 FY exclusive provision of sub-allocation in bridge/culvert maintenance has been made under periodic maintenance to take care bridges and culverts, so that proper maintenance of these valuable assets are ensured.

A few common defects associated with bridge/culvert maintenance 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.

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

7.0 Re-classification of Roads

The road network of Bangladesh has recently been reclassified and the responsibilities of construction, development and maintenance of primary and secondary roads have been entrusted to Roads and Highways Department (RHD) and Local Government Engineering Department (LGED) respectively. 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 new classification LGED will be responsible for construction, development and maintenance of three classes of roads, namely: Upazila Road, Union Road, Village Road, while some of these three category roads will also continue as Local Government Institution (LGI) roads. RHD will be responsible for National Highways, Regional Highways, and Zila Road. Road type along with definition and the ownership and responsibility are furnished in Table-1 below:

Table-1: Road Network Classification with Definition

Sl. No	Type	Definition	Ownership and Responsibility
1.	National Highway	Highways connecting National capital with Divisional HQ/s or sea ports or land ports or Asian Highway	RHD*
2.	Regional Highway	Highways connecting District HQ/s or main river or land ports or with each other not connected by National Highways.	RHD

Sl. No	Type	Definition	Ownership and Responsibility
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 HQ/s, 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 HQ/s, 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

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.

* RHD- Roads and Highway Department; LGED- Local Government Engineering Department; LGI- Local Government Institutions.

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

7.1 Pavement Design Standards

Recent economic growth has led to a change in the volume and composition of traffic on Bangladesh's roads. This has necessitated the adoption of geometric and pavement design standards, which are in line with, present conditions. It has been approved by the Government 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 commercial vehicles (mainly applicable for LGED). Design types 3 and 4 (mainly applicable for RHD) are based primarily on forecasts of peak hour passenger car units (pcu's). The recommended pavement design section of various design type mentioned above are given in the Figure 1 and Figure 2 below. The geometric design recommended for each type of road is summarised in Table-2

Table-2: Recommended Geometric Design Standard

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 / 0	1.25 / 4	5.5 /18
	7	3.7 / 12	0.0 / 0	0.90 / 3	5.5 / 18
Upazila Road	7	3.7 / 12	0.0 / 0	0.90 / 3	5.5 / 18
	6	3.7 / 12	0.0 / 0	1.8 / 6	7.3 / 24
	5	3.7 / 12	0.9 / 3	0.9 / 3	7.3 / 24

Road Class	Design Type	Carriageway (m)/(ft)	Hard Shoulder (m)/(ft)	Verge (m)/(ft)	Crest Width (m)/(ft)
Zila Road	6	3.7 / 12	0.0 / 0	1.8 / 6	7.3 / 24
	4*	5.5 / 18	0.0 / 0	2.15 / 7	9.8 / 32
	3	5.5/18	1.2/4	0.95/3	9.8/32

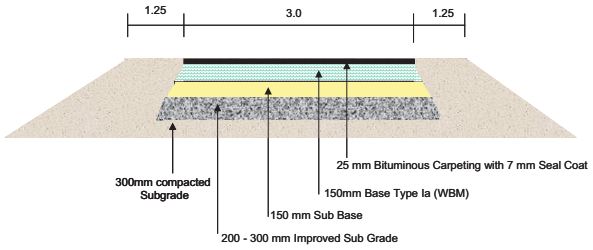
*** In case of land acquisition problem and resource constraint, crest width of 7.3 metre/24 feet may be allowed in special cases.**

Traffic criteria for each design type is shown in Table-3 below:

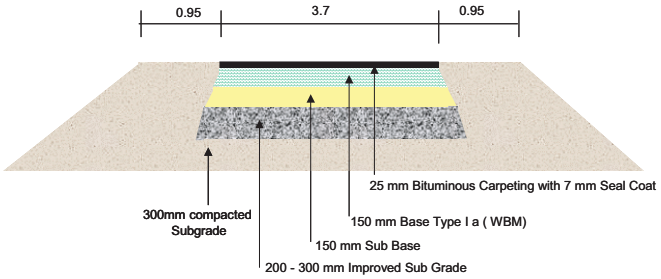
Table-3: Traffic Criteria for Design Purposes

Design Type	Daily Commercial Vehicles (CVD)
8	Up to 50
7	51-100
6	101-200
5	201-300
4	301-400

Figure 1: Approved Pavement Designs for Union Roads



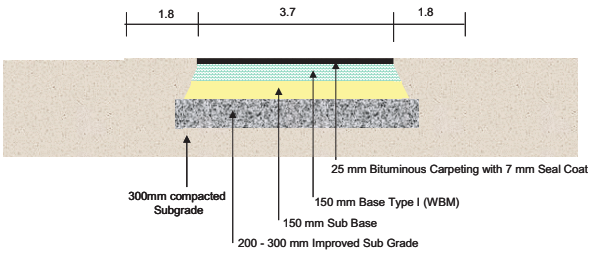
Design Type 8



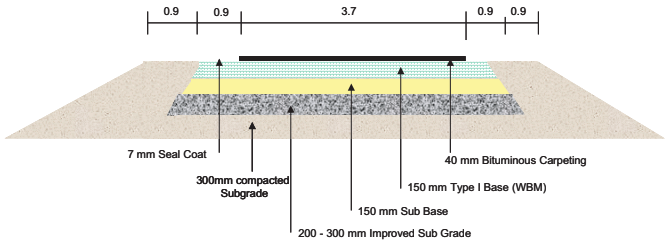
Design Type 7

Union Road defined in 2003

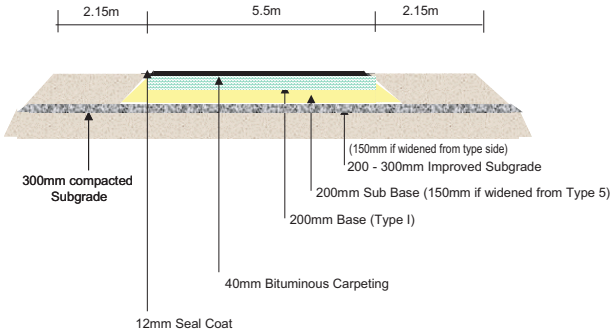
Figure 2: Approved Pavement Designs for Upazila Roads



Design Type 6



Design Type 5



Design Type 4

Upazila Road defined in 2003

7.2 Construction Materials and Terminology

In order to develop unified standards for all road organisations Government has finalised certain terminology, nature and basic parameters of the various materials, which will be used during the construction of a road.

The agreed terminology and basic parameters for road pavement materials are shown in Tables-4 and 5.

Bituminous Bound Materials **Table-4**

Pavement Layer	Basic Properties	Brief Description of materials
Dense Bituminous Surfacing (DBS)	ACV of aggregate <30%	Mixture of Stone, fine filler and bitumen carefully graded to give a dense material with no voids. Mixed and laid by machine whilst hot.
Double bituminous surface treatment (DBST)	ACV of aggregate <28%	A combination of hot bitumen sprayed onto the road by machine and a single sized stones spread and rolled into the bitumen whilst hot. The process is then repeated using a second layer of bitumen and smaller sized stone.
Single bituminous surface treatment (SBST)	ACV of aggregate <28%.	A combination of hot bitumen sprayed onto the road by machine and single sized stones spread and rolled into the bitumen whilst hot.
Seal Coat	------	A mixture of bitumen and coarse sand/pea gravels mixed hot before spreading and rolling. Usually carried out using labour intensive methods.
Bituminous Carpeting	ACV of aggregate <30%.	A mixture of bitumen and graded stone mixed hot before spreading and rolling. Usually carried out using labour intensive methods.
Tack Coat	------	A coat of lightly cutback bitumen sprayed onto an existing bituminous surfacing to provide a bond before laying a new bituminous layer such as carpeting or DBS.
Prime Coat	------	A coat of heavily cutback bitumen sprayed onto an existing granular surfacing to provide a bond before laying a new bituminous layer such as carpeting or DBS. The spray rates for prime coats are normally about twice those of tack coats.

The layer of soil immediately below the road pavement is referred to as the subgrade and this is normally more carefully selected soil, which is given additional compaction to increase its strength. It is decided by the Government that in all cases the depth of subgrade compaction should be 300mm. Because in Bangladesh it is often difficult to achieve satisfactory CBR values on naturally occurring subgrades; improved subgrades usually consisting of fine sand are normally used. The thickness of improved subgrade is to be determined by the CBR of the natural subgrade according to Table-6.

Granular Materials **Table-5**

Pavement Layer	Minimum CBR % (Lab. Test after 4 days soaking)	Maximum Field DCP Test mm/blow	Maximum Aggregate Crushing Value %	Required Compaction (Lab. Test after 4 days soaking)	Typical Materials Likely to meet specification.
Base Type I	80%	3.5 mm/blow	30%	98% Vibrating Hammer /Heavy Compaction	Graded stone or graded stone with some brick or brick if it can meet specification
Base Type Ia	80%	3.5 mm/blow	30%	98% Vibrating Hammer /Heavy Compaction	Brick if it can meet specification
Sub-base	30%	9.0 mm/blow	32%	98% Vibrating Hammer /Heavy Compaction	Graded materials consisting of brick or brick sand mixtures. Re-cycled pavement materials such as brick, broken concrete, old surfacing etc.
Improved Subgrade	8%	22 mm/blow	---	98% Vibrating Hammer /Heavy Compaction	Usually locally occurring fine sand
Subgrade (compacted min. 300mm thickness)	4%	30 mm/blow	---	98% Standard Compaction	Natural soil of low plasticity
Earthwork in Embankment	3%	45 mm/blow	---	95% Standard Compaction	Natural soil of low/medium plasticity

Table-6: Thickness of improved subgrade for various subgrade CBR values.

Min. CBR Value of Subgrade material (at specified compaction) %	Thickness of Improved Subgrade to give CBR of 8%
3%	300 mm
4%	250 mm
5%	200 mm

8.0 Road and Structure Database

A comprehensive and reliable database of road network information is an essential pre-requisite for an effective and efficient road maintenance management system. All management information rely on these information being appropriate and up-to-date. Information are needed on items such as road network details, traffic and axle loads, costs, road conditions, etc, which in turn depends on existence of relevant data on which the information are based. The need to assess physical condition, safety, and level of service and efficiency of operation of road system is widely recognised. In addition to knowing the characteristics of the existing road system, it is becoming increasingly important to be able to predict the effects that the proposed policies are likely to have in the future. Such predictive capabilities enable the decision-makers to test alternative courses of

action to determine which policies and strategies will be the most effective in accomplishing the desired goals with the resources available.

Data are, therefore, needed to provide the basis for management decisions on different aspects, such as:

- Determining optimum road condition, and the maintenance strategies and expenditure needed to achieve this.
- Determining optimum road condition with actual budget constraints.
- Assessing current level of road and bridge condition.
- Determining appropriate level of investment.
- Prioritising investment in maintenance operations.
- Simulating the effect of any improvement on the future condition and performance of road system.
- Estimating the cost of improvement.
- Controlling on-going expenditures.

Management information of this nature provides the quantitative basis of dialogue between department and ministry of finance during the fund allocation process. It can also provide the basis of a dialogue with political representatives, road users, farmers and others, and for monitoring departmental performance and the meeting of policy objectives.

Quite a great deal of work in this line has already been done by LGED to create an extensive database of road network and other rural infrastructure under its jurisdiction through out the country. These data are now stored in customised computer software – Road and Structure Database Management System (RSDMS), now widely used in each Upazila, Zila, Regional and LGED HQ offices, whereas the central database is established at the maintenance unit (RIMMU) of LGED HQ. For regular update of these data a simple systematic system has been established, using its own trained staff at the field level and the data are stored in RSDMS using the concept of information grouping, depending on management needs. The cost of data collection is always very high and most expensive aspect of implementing and operating a road management system. System operation, itself, is likely to cost between 2 to 4 percent of the maintenance budget provision. At present these costs are mainly borne by the different projects funded by JICA, JBIC, WB etc. which need to be shifted to the Government's own revenue budget. Many road organisations have fallen trap of collecting large amount of data, but making only limited use of this for analysis and decision-making. In LGED careful efforts have undertaken to make an appropriate data design, so that only those data are collected where their need can be justified. Information groups usually collected for storage in RSDMS of LGED network are tabulated bellow:

Table-8.1 Information Groups

Element	Aspects
Road Inventory	Network /location
	Geometry
Traffic	Volume
	Accidents
Pavement	Pavement structure
	Pavement condition
Structures	Structures Inventory
	Structure condition
Finance	Costs
	Budget
	Revenue
Activities	Projects
	Interventions/Treatments

For any road organisation human resource issues of staffing and training are extremely important. Experience suggests that staffing and training needs in connection with implementation of information and management system are usually under-estimated considerably, leading toward failure of proper information management. In LGED human resource development by providing necessary training and right level of staffing are always get priority and it is considered as the main impetus to its success stories.

8.1 Inventory Data

Clearly, it is not possible to manage any asset without first defining exactly what that asset is. There is, therefore, a need to define and reference the network to be managed. This is the purpose of a road inventory, and there are two main classes of data that are normally grouped together under this term:

- Network Referencing – concerned with location of the road and its appurtenances, together with its alignment and geometry.
- Item Inventory – concerned with the physical attributes of the road.

8.1.1 Network Referencing

This involves breaking the network into successively smaller links, segments and sections, each of which can be defined uniquely. It is appropriate to these terms in the following way:

- Route – A length of road between an origin and a destination.
- Link – A length of road that is uniform in terms of traffic volume that it carries.
- Segment – A length of road that is uniform in terms of its geometric characteristics.
- Section – A length of road that is uniform in term of its physical characteristics; sections are normally the basic unit of a road network for road management processes.
- Sub-section – A division of a section used for more detailed analysis of condition.

A set of route, links, segments, sections or sub-sections can be grouped together to form a road network.

The process of referencing a network involves both logical and physical activities. For example, section should be selected, on a logical basis, to have homogeneous characteristics, with the following typically being uniform for a section:

- Road Class
- Traffic Level (i.e. sections will not include any major sections)
- Road Geometry
- Pavement Construction Type
- Other administrative data deemed appropriate, such as administrative boundaries, speed limits, and the like.

Logical referencing normally requires that the section is identified by a unique and unambiguous reference or label. A label would typically consist of a road name, or number, and a length identified by a start and end chainage. It is possible to associate a string of text to a label in most systems to assist in identification in the field.

It is necessary to match the logical definition of the network with the physical referencing. Sections are needed to be identified physically on the ground to enable work crews to identify location. Many different systems of physical referencing are in use, ranging from concrete ‘kilometre post’ to signs containing bar codes, which can be read automatically by high-speed survey vehicles.

For LGED road system logical referencing of its every individual roads are typically done by a label consists of ten-digit number and a length, identified by start and end location of the road. And for physical referencing concrete km post or well identified permanent object along the road are used. The road network can, alternately, be defined spatially using grid co-ordinates. Spatial referencing is particularly appropriate for certain route planning activities or for storing map-based information relevant to the network.

The increasing availability, accuracy and cost-effectiveness of global positioning system (GPS) resulted in increased use of this mode of network referencing. Linear and spatial referencing systems can be combined by attributing grid co-ordinates to sections. Doing this enables map-based graphics to be produced, or for links to be made to geographic information system (GIS). In LGED already GPS of the Upazila and Union Road System have been completed and GIS maps of the whole country, mainly for its road system, also have been completed and regular up dating is being done to keep it up-to-date. Referencing a network is always a time consuming activities, but good referencing pays dividends and should be seen as providing the basis for all subsequent planning and management activities.

8.1.2 Item Inventory

Item inventories are those features of the road that remains reasonably constant over time. An inventory consists of such items as the lengths and widths of carriageway, and details of drainage, road signs and the like. These records are essential for allocating funds in an appropriate manner, and for calculating maintenance costs, putting work out to tender and for supervising work. Item inventory can be sub-divided further into two groups:

- Continuous Item Inventory

  The model of a road that describes longitudinal features (carriage ways, kerbs, shoulders, verges, footways, cycle tracks and medians).

- Point Item Inventory

  Other physical items, such as drains, road markings, streetlights, signs, structures and the like, the position of which may be defined by its chainage.

The existence of a basic road inventory enables:

- A more rational approach to the development and control of the maintenance budget.
- Improved pre-planning, contract formulation and control of work.
- Operational improvements to be identified, particularly for routine maintenance activities.
- A better understanding of the changing volume of demand, such as for the adoption of new roads or the provision of street lighting.
- The measurement of outputs, such as the cost of side drains cleaned, or the percentage of the network treated in any one year.

8.2 Traffic Data

Traffic data are a measure of the use of the road, and therefore, provide important information about the needs of the road users or 'customers'. Traffic data are also necessary to enable projection of road performance. Various types of traffic information are needed to assist with the road management are listed below:

- Traffic characteristics and volume
- Axle loading
- Accidents

8.2.1 Traffic characteristics and volume

Traffic Characteristics:

For the purpose design and the evaluation of benefits, the volume of current traffic needs to be classified in terms of vehicle type. A typical classification used in LGED is shown in the Table 8.2 in order to assess benefits, it is also necessary to separate traffic into the following three categories, since each is treated differently in a cost-benefit analysis:

- Normal Traffic
  Traffic, which would pass along the existing road if no investment took place, including normal growth.

- Diverted Traffic
  Traffic that changes from another route (or mode) to the road, but still travel between the same origin and destination.

- Generated Traffic
  Additional traffic, which occurs in response to the provision or improvement of a road.

Table 8.2 Traffic classification used in LGED

Class	Description
Motorised:	
Motor Cycle	All two wheeled motorised vehicle
Tempo/Auto Rickshaw	All three wheeled motorised vehicle
Car	All saloon Cars and Taxis
Delivery Vehicle	Panel van, Pickup Truck
Utility	Landrover/Jeep type vehicle
Bus Light	<16 seats
Bus Mini	16-39 seats and <36 feet chassis
Bus Heavy	>40 seats and >36 feet chassis
Truck Light	Two axle rigid (<3.5 ton payload)
Truck Medium	Two or Three axle rigid (>3.5 ton payload)
Non-Motorised:	
Bicycle	All two wheeled non-motorised vehicle
Rickshaw/Rickshaw Van	Three wheeled passenger/cargo non-motorised vehicle
Animal Cart	All animal carts and human drawn/push carts

Traffic Flow:

Estimates of traffic flow along road section are needed for most aspects of planning and management. The level of traffic will, for example, influence the standard of geometry and pavement design, and the maintenance standard in terms of frequency of maintenance activities.

The first step in assessing demand is to estimate baseline traffic flow, or, in other wards, to determine the traffic volume actually travelling on the road at present. The estimate normally used is the annual average daily traffic (AADT), classified by vehicle category. This is defined as the total annual traffic in both directions divided by 365. Estimates of AADT are normally by recording actual traffic flow over specified shorter period than a year, and results are scaled to give an estimate of AADT. Both manual and automatic methods of counting can be used for this purpose, and each is appropriate in different situations. Both methods are prone to inaccuracy: automatic methods because of difficulties of setting vehicle sensors to record vehicles or axles correctly, and manual methods because of human error.

Traffic counts carried out over a short period as a basis for estimating the AADT can produce estimates which are subject to large errors because traffic flows can have large hourly, daily, weekly, monthly and seasonal variations. The daily variability in traffic flow depends on the volume of traffic, increasingly as traffic level fall, and with high variability on roads carrying less than 1000 vehicles per day. Traffic flow varies more from day-to-day than week-to-week over the year, so that there are large errors associated with the estimating annual traffic flows (and subsequently AADT) from traffic counts of a few days duration. For the same reason, there is a rapid fall in the likely size of error as the duration of counting period increases up to one week. Traffic flows also varies from month-to-month, so that a weekly traffic count repeated at intervals during the year

provides a better base for estimating the annual volume of traffic than a continuous traffic count of the same total aggregate period. Traffic also varies considerably through the day, but this is unlikely to affect the estimate of AADT, provided sufficient and appropriate hours are covered by the daily counts.

The key issue is that, recognising that estimates of traffic flow are subject to large variability, the amount of effort put in to reducing the variability should depends on the use, to which the data will be put in terms of ultimate management function.

Traffic Growth:

Estimate must also be made about how this traffic will grow in the future, as many road management decisions are very sensitive to traffic forecasts. Forecasting growth reliably is notoriously difficult, especially when considering the variability likely to be present in estimates of current flows. Even in the industrialised countries with stable economic conditions, large errors can occur but in countries with developing or transitional economies, the problem becoming more intractable.

Different methods of forecasting tends to be used depending on the type of traffic being considered. These can be summarised by the following:

- ✓ **Normal Traffic**

  Based on extrapolation of historical time-series data for traffic growth, fuel sales, GDP or other relevant parameters, but taking into account any specific local circumstances.
- ✓ **Diverted Traffic**

  Estimates normally based on origin and destination surveys.
- ✓ **Generated Traffic**

  Normally based on 'demand relationships' which indicate the likely increase in traffic level for different levels of cost saving; generated traffic is particularly difficult to forecast.

8.2.2 Axle Loading

The deterioration of pavement caused by traffic results from both the magnitude of the individual axle loads and the number of times that these loads are applied. For pavement design and maintenance purpose, it is therefore necessary to consider not only the total number of vehicles that will use the road, but also the axle loads of these vehicles. To do this, the axle load distribution of a typical sample of vehicles using a road must be measured. The axle loads can be converted using standard factors to determine the damaging power of different types of vehicle. This damaging power is normally expressed as the number of equivalent standard axles (ESA), each of 80 kN that would do the same damage to the pavement as the vehicle in question. This damaging power is termed the vehicle's equivalent factor (EF) and the design lives of pavement are expressed in terms of ESAs that they are design to carry.

The relationship between the vehicle's EF and its axle loading is normally expressed in terms of the axle mass in kg, rather than in terms of the force that they apply to the pavement in kN. The relationship is normally considered to be of the form:

$$EF = \sum_{1=1}^{j} \left[\frac{a \times le_i}{8160} \right]^n$$

Where $axle_i$ = mass of $axle_i$ (kg)

J = the number of axles on the vehicle in question

N = a power factor that varies depending on the pavement, construction

type, subgrade and assumptions about failure criteria, but with a value typically of around 4.0 and the standard axle load is taken as 8160 kg.

The only effective way to determine the damaging effect of traffic on different roads is to measure the complete spectrum of axle loads, and to calculate the consequential damage in terms of standard axles. Axle load survey can be carried out using a variety of types of equipment, ranging from small portable weighbridges, through 'weigh-in-motion' systems, to fixed static weighing platforms.

In the past, it has been customary to assume that the axle load distribution of heavy vehicles will remain unchanged for the design life of a new or strengthened pavement. However, more recently it has become clear that there is a tendency for steady growth over time of vehicle axle loads, and forecasts of this are needed to avoid underestimating future pavement damage. There are also examples where the introduction of fleet of new and different vehicles can radically alter the axle load distribution on a particular route in a short time. Such events cannot normally be forecast and, hence, extrapolation from existing axle load surveys cannot provide for this sort of eventuality. Regular traffic surveys should highlight such situations, and new axle load surveys should then be carried out, as appropriate.

8.3 Pavement Data

8.3.1 Defects

The network definition and inventory items provide basic information about the network to be managed. These data do not change, or change very slowly, over time. Information about the condition of the network does change, sometimes rapidly over time. The comparison of measured road condition with predefined standards, or intervention levels, provides a basic statement of shortfall in serviceability, which can be translated into maintenance need. Pavement condition is assessed by observing or measuring defects, and it is convenient to group these in terms of following parameters.

Roughness

This is sometimes identified as 'riding comfort', and is a measure of the longitudinal unevenness of the road surface. It is a major determinant of changes in vehicle operating cost and is, therefore, probably of greatest concern of the road users. Roughness is normally measured in units on 'International Roughness Index' (IRI) and usually assessed using mechanised means.

Surface Distress

This is most common to the maintenance personnel, and generally shows up as rutting, cracking, spalling and the like. Once visible signs of distress appear, then more expensive corrective maintenance is likely to be required to prevent more major forms of distress (e.g. untreated cracks can lead to water ingress to the road base, resulting ultimately in a structural defect). Distress is normally measured or assessed by visual methods or manual measurement, although, increasingly, mechanised methods are available for certain types of defects.

Structural Capacity

As traffic accumulates, so does structural damage to the pavement layers. Some of this, such as rutting or cracking, is seen at the road surface; other damage, such as road base fatigue or sub-base soil contamination, is not seen at the surface. Indirect methods of assessment are usually employed, most of which are based on measurement of surface deflection under a dynamic load applied either by a moving vehicle or a dropped weight.

Pavement Texture and Friction

These give an indication of the safety of the road through their ability to prevent the skidding of vehicles. Measurements may be divided into two categories:

- **Texture**
- **Wet-skidding resistance.**

These are normally made with manual or vehicle mounted instruments, which are used to identify potentially hazardous situations requiring action.

Defects are assessed using condition surveys of roads. These can be undertaken in a number of ways, ranging from high-speed to slow-speed, mechanised to manual; destructive and non-destructive and the like. Pavement assessment techniques used in LGED are discussed in details in the annexes.

9.0 Maintenance Need Assessment

Need assessment is an essential step in planning and estimating each year for the road maintenance programme, determining a rational basis for the judicious allocation of maintenance funds to each district. In order to do this, it is necessary to collate all necessary information pertaining to the road network, as well as considering the factors those are affecting its deterioration.

The process starts at upazila level. The Upazila Engineer will consult with Upazila Road Users Committee (where applicable) and local people's representatives about the maintenance need of the local roads in actual terms. The Upazila Engineer along with his technical staff should carry out detailed inspection by visual road condition survey/roughness survey of the whole network to get correct assessment of condition of the network. The over-all condition of the network under the upazila shall have to be considered in the process of assessment of maintenance need. Now-a-days road roughness survey is widely used for assessing the over-all condition of road network. It is most recent and quick reliable process of objectively measure the road condition, basically a small instrument 'Bump Integrator' fitted with the Jeep or Pick-up Van measures the cumulative amount of bumps on the road stretches, which in turn gives the roughness number of the road stretch indicating actual condition of the road surface. The following table can be used for this purpose:

Table-9.1: Road Condition and Probable Maintenance Option based on Roughness Count

IRI <= 4.0	GOOD	Routine Maintenance
4.1 <= IRI <= 6.5	FAIR	Resealing
6.6 <= IRI <= 8.5	POOR	Overlay
IRI > 8.5	BAD	Partial/Full Reconstruction

In order to assess the annual maintenance need of maintainable road network under the upazila, most recently updated road and structure inventory of the concerned upazila will be considered as the source of data and the criteria given below shall have to be followed. The rapid visual road condition survey may be carried out as an alternative to the roughness survey on the BC road network where equipment for roughness survey is not available. The rapid visual road condition survey will indicate the general condition of the network and will identify road sections those require routine or periodic maintenance or some sort of rehabilitation work in the near future. Eventually a detailed road condition survey will be performed on those identified sections in order to prepare cost estimate for finally drawing up of Annual Maintenance Programme.

1. Routine maintenance of "Off-pavement" of all Upazila Roads and paved Rural Roads under the upazila must be ensured. Destitute women will carry out this activity in length-person system throughout the year. In order to calculate probable maintenance cost per kilometre of road length, labour wage, cost of small hand-tools, etc. should be considered.

2. Routine maintenance of "On-pavement" of paved Upazila Roads and Rural Roads network shall have to be taken into account when and where it become necessary. To carry out the job at least one Mobile Maintenance Team (MMT) will be formed at district level and the team will move from one place to another to repair the patches. Cost estimation for this operation will depend upon the length of bituminous paved road within the upazila/district and their condition. A perfect guess on on-pavement maintenance requirement could be obtained from the Form: Condition & Roughness Survey Form for the Upazila, where roughness survey has been completed, the 'good' and 'fair' rated portions of the paved road stretches will be eligible for on-pavement maintenance. To assess maintenance cost per kilometre of road length, materials, labour wage, cost of small hand-tools, transportation, etc. will come under consideration. Where necessary installation and maintenance of traffic sign will also be included under this operation.

3. "Routine Maintenance Plan" button on the front interface of RSDMS-V will give the total routine maintenance need, comprising both on-pavement and off-pavement routine maintenance of the Upazila roads.

4. Periodic maintenance need in real term would depend mostly upon the existing condition of road assessed through detailed visual inspection or roughness survey. At the same time some other important criteria should also be taken into account, amongst them the following are the most notable: i) traffic volume, and ii) pavement strength. At the time of maintenance need assessment high priority has been given to roads with higher traffic volume regardless of the road-class it actually belongs. Similarly, road stretches with high deflection values falls beyond the scope of maintenance regime as those roads need major reconstruction.

5. To fulfil the periodic maintenance need emphasis should be given on both rolling re-seal and overlaying programme at a regular interval of time. It could be a 3-5 year cycle for resealing programme on 'fair' rated portion of paved road length, while 8-12 year cycle for overlaying programme on 'poor' rated portion of the network of each district. In order to calculate possible financial requirements, LGED standard specifications and schedule of rate of the concerned district shall have to be consulted against the specific type of work.

The Executive Engineer of the district along with the Assistant Engineer will scrutinise all submissions received from Upazila Engineers and will finalise assessments of district's total need after consultation with the District Maintenance Committee. The need of the district will then be submitted to the office of Superintending Engineer of the region. Superintending Engineer will then convene a special meeting with the Executive Engineers of the region and finalise total requirements of the region and forwarded to LGED HQ. All the submissions of maintenance need at different level will be prepared by using the RSDMS-V and then forwarded them through exporting relevant data in CD/Portable Drive before the cut-off date. In the RIMMU country's total need is complied and a complete report on total maintenance need is prepared using RSDMS-V, one copy of the country total maintenance need is also forwarded to M/O Finance for budget allocation from revenue budget.

10.0 Scheme Identification and Priority Ranking

Scheme identification and priority ranking activities for the preparation of Annual Maintenance Programme are started from the upazila level. The main sources of schemes will be the total list of candidate roads prepared at the time of total maintenance need assessment of the Upazila, based on last road condition survey/road roughness survey. In order to ensure effective maintenance based on actual need, the maintainable road network of the upazila (connected to growth centers, important rural markets, upazila HQ. to union parishad office, education center, health center, social and welfare organisation) should be marked on the upazila/zila road map. The hard and soft copy of digital road map of upazila/zila/region could be collected from GIS unit of LGED HQ. Dhaka for use in maintenance planning. While ranking priority, the maintainable road network of the district must be taken into consideration and no stray isolated road link should get priority over roads fall on a network.

Upazila Engineer will check the existing condition of all important roads and structures identified on the upazila road map, so that a clear picture of the entire road network including the structure remains in front of him during making selections. Traffic volume of all the road links will act as the primary factor for priority ranking; higher the traffic volume higher will be the rank. He should also exclude the roads with very weak structural strength, identified by deflection survey. The significance of deflection of a road pavement lies in the fact that if the deflection value goes beyond certain observed value, there is no point to repair the road stretch other than to reconstruct it.

After this, the Upazila Engineer will sit for meeting with the public representatives (UP Chairman, Member), local people and with the Upazila Road Users Committee (as applicable) to discuss about the importance of roads based on amount of traffic it actually carries and their present condition under his jurisdiction. Participation of the users is very important to create ownership of these huge public investments. The preliminary selection of schemes including priority ranking will be done in consultation with the road users. At this time he should not forget the socio-economic considerations, like maintaining access to backward section of the society, interior area with high economic potential, etc. The list of these schemes shall have to be submitted to the respective Upazila Parishad for necessary approval. After completing the above procedure the Upazila Engineer will send the proposal to the executive engineer within the stipulated date for necessary inclusion of the upazila approved maintenance plan in the district maintenance programme of the district.

All Upazila roads and paved Union roads of the district shall have to be included in the routine maintenance programme, since these roads connect the growth centres, important rural market and other socio-economic infrastructure to the arterial road system (national, regional and zila road network). Any of the above roads should not be dropped out from routine maintenance programme and priority must be given to maintain all these roads by length-person round the year for which fund from GoB revenue budget shall have to be allotted right from the beginning of the year. Off-pavement maintenance and roadside plantation including care taking shall be treated, as an integral part of scheme under routine maintenance and that has to be implemented simultaneously.

The important links of paved road network, rated ‘fair’ by most recent condition survey/roughness survey and no serious sign of distress is visible on the road surface and age of surfacing or the last maintenance is not less than four years should come under periodic re-sealing programme first to rejuvenate the pavement surface. Donor funded Upazila roads will receive priority in the re-sealing programme among other roads of the district. A rolling re-seal programme for 4-year cycle has to be chalked out where all maintainable paved roads of the district identified earlier should be accommodated.

On the other hand, 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 – 12 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. A rolling overlay programme for 10-year cycle has to be chalked out where all maintainable paved roads of the district identified earlier should be accommodated. Regular overlaying is crucial for the network and should be given equal importance with the re-sealing programme as a continuous process.

Once the scheme identification part is complete then prioritisation and optimisation, as money is always scarce, comes in. The following points should be taken into account while ranking priority for undertaking maintenance schemes in any districts in any financial year:

- First of all, the whole Upazila roads network (earthen & paved) and the paved Union roads shall have to be taken under routine maintenance programme.
- Upazila roads, those have been constructed in full length including necessary bridges and culverts under foreign-aided project will receive top priority for any kind of maintenance.
- Higher priority should be attached to roads carrying higher volume of traffic irrespective of its road class.
- The roads where pavement construction has not been completed in full length but completed up to an important point, maintenance can also be taken up for these roads but will receive comparatively a lower priority.
- Bridge/culvert in Upazila roads will get higher priority.
- Maintenance of bridge/culvert on rural roads may be taken up after fulfilling demand of bridge/culvert maintenance on Upazila roads.

11.0 Treatment selection

11.1 Approach to treatment selection

The use of standard rules for treatment selection ensures that a consistent approach is taken to planning and specifying works throughout the road administration. This help to ensure that funds are spent to greatest effect, and each road and part of the network receives its fair share of the budget. The rule should reflect the standards and intervention levels defined in the policy framework. Two fundamentally different types of rules are available:

1. **Scheduled**

   Fixed amounts of work (such as a quantity of work in m^2/km) are specified per unit time-period (such as one year), or work is specified to be undertaken at fixed interval of time.

2. **Condition-Responsive**

   Work is triggered when condition reaches a critical threshold, known as an ‘intervention level’.

11.1.1 Scheduled Methods

This type of rule is often used where need is related to environmental conditions (such as cutting back vegetation growth, or cleaning culverts). The approach is also particularly relevant where the deterioration rate is stable. Works can be scheduled at the programming stage when the frequency of intervention is the same year-after-year. Also, where rates of deterioration are rapid, such as for the surface of earthen roads, it is impracticable to respond to defects assessed as the result of condition surveys. Scheduled maintenance may, therefore, be more appropriate.

Routine maintenance of a cyclic nature is normally carried out on a scheduled basis. The schedule for undertaking cyclic activities will often depend upon road class to reflect ‘level of service’ considerations, although it hard to justify on purely engineering grounds. Periodic works, such as surface dressing, may also often be specified this way, particularly where the effect of sever environment outweighs the damaging effect of traffic.

The treatment selection issues concerned with scheduled methods are related mainly to engineering decisions about the treatment method rather than to fundamental decisions about which treatment to apply. The other area of decision is the frequency at which the work is

scheduled, decisions are to be made on the basis of engineering judgement, based on local observation, and/or political decisions relating to amenity value. Such decisions will also be tempered by the availability of funds for such works.

11.1.2 Condition-Responsive Methods

Whereas scheduled rules are relatively easy to specify and implement, there are several other methods of specifying condition-responsive rules. These rules involve the use of intervention levels which, when exceeded, triggered different treatments. The following indicators of pavement condition should be considered:

- Roughness
- Surface distress
- Structural capacity
- Pavement texture and friction.

11.2 Optimisation Approach

This treatment selection method differs from all of others because it does not use intervention level. Instead, an optimisation problem is set up that choose between all possible treatment options applied to all sections of road in the network. Treatment options are characterised by their cost, life, and their impact on road condition. The optimisation method chooses one treatment option for each section in such a way that either:

- The quality of network condition over time is maximised, or
- The road maintenance costs over time is minimised.

Other factors, such as the implications on road users costs, may also be taken into account.

This process is particularly useful at network level, where the plan of programme is subject to budget constraint. This means that there may be insufficient funds to carry out treatments on all sections that are defective. The method chooses the best combination of treatment across sections that meet the relevant optimisation criteria.

17.0 Supervision and Monitoring

Day to day supervision and monitoring of all maintenance activities will be the responsibility of upazila technical staff, namely the SAE (Maintenance), supported by other staff if required. The Upazila Engineer will have overall responsibility for the co-ordination and proper implementation of all maintenance activities within the upazila and shall personally inspect works on a regular basis.

Besides, the Assistant Engineer of Executive Engineer's office at district level will have a very important role in planning and implementation of maintenance works of the entire district. Major responsibilities of Assistant Engineer in this regard could be summarised as below:

- To inspect regularly all roads of the important road network of the district and also co-ordinate with the Upazila Engineers to carry out Road Condition Survey (RCS), Roughness Survey, Traffic Survey, Deflection Survey and Detailed Visual Inspection (DVI) of the paved road network of the district. He should regularly collect data from Upazila and preserve them properly for necessary references.
- To act as Member Secretary of the District Maintenance Committee (DMC) and take initiatives for regular holding of DMC meetings and follow-up its decisions.
- To determine the priority ranking of the maintenance schemes submitted by Upazila Engineers and present the priority ranking before the District Maintenance Committee for their consideration.
- To assist Executive Engineer to send necessary reports/returns to LGED HQ.

Dhaka in time in accordance with the maintenance guidelines.

- To sample-check estimates of maintenance schemes in the field on random basis as mentioned in the manual submitted by Upazila Engineers.
- To monitor the progress of all types of maintenance works under implementation in the district and undertake regular spot-checking to ensure quality of works.
- To preparing consolidated physical and financial progress report of the district after collecting progress data from Upazilas and send those reports to higher level offices in time.
- To operate routine on-pavement maintenance works of the district by Mobile Maintenance Team (MMT) and ensure its proper functioning.
- To update the road & structure inventory of the district by compiling updated inventory data obtained from the Upazila Engineer's office using the Road and Structure Database Management System (RSDMS-V) regularly and send to regional Superintending Engineer's office and LGED HQ. within the cut off date.
- To collect hard and soft copies of digital road map of the Upazila/district/region from GIS unit of HQ. and preserve them in his computer and update these maps regularly.
- To identify the important road network of the district and mark them on the digital district road map and on hard copy road map, and to take initiative to finalise alignment of important road network in the DMC and preserve them for future reference.
- To prepare and collect necessary report/information related to rural infrastructure maintenance and send them to RIMMU, LGED HQ./other offices as and when requested.

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

- Implement and monitor progress of all maintenance-related activities of the upazila as instructed by the Upazila Engineer.
- Collect detailed information of upazila road network through Road Condition Survey (RCS), Roughness Survey, Traffic Survey, Deflection Survey and Detailed Visual Inspection (DVI) as instructed in the maintenance guidelines.
- Update road and structure inventory including the road map of the concerned upazila and maintain construction and maintenance history of road.
- Prepare cost estimates of maintenance scheme using LGED's standard specifications and schedule of rate after taking detailed measurement at the field.
- Ensure implementation of maintenance works as per approved drawings, design and specifications.
- Monitoring and supervision off-pavement maintenance by length-persons including care taking of the trees planted on those roads.
- Monitoring and supervision on-pavement maintenance work by mobile maintenance team at upazila level.
- Plan appropriate maintenance actions through conducting regular inspections to the upazila road network.
- Prepare physical financial progress report of maintenance schemes and submit them to Upazila Engineer for necessary action.

The Executive Engineer should also pay regular visits to the field and shall be responsible for the proper execution of the maintenance programme of the district. In each district there will be a District Maintenance Committee (DMC), comprising the Executive Engineer as convenor and Assistant Engineer as member-secretary from district office, and all other Upazila Engineers of the district as member of the committee. DMC must meet at least once in a month for a meeting to review progress of different on-going works in the district. A progress report including the proceedings of each monthly DMC meeting must be sent to the LGED HQ within 7th day of each calendar month.

18.0 Quality Control

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

Compliance with specified compaction requirements must be checked in particular by carrying out regular testing, both on site and in the LGED district laboratories, where all materials should also be tested on a regular basis. In case of roadwork, the underlying subsequent layers shall be placed after obtained necessary clearance from the Executive Engineer/Upazila Engineer 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 carried out is found to be satisfactory after laboratory testing. The test frequency for different test should be determined by using Appendix 11. Required tests with necessary frequencies shall have to be mentioned in the tender schedule, so that the bidders are well aware about the lab test while participating in bidding process. The Regional Superintending Engineer will regularly monitor and supervise the quality control aspect of implementation of maintenance programme.

19.0 Reporting Progress

The Forms and Reports referred in this guideline must be used carefully. In the process of scrutinising/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 performed. Payment cannot be made for any work before obtaining satisfactory test results of it, failing to ensure quality departmental action will be taken against the concerned person. 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 next month using the Forms generated from RSDMS-V. The progress report submitted by the districts without using RSDMS-V will not be accepted.

20.0 Annual Work Schedule

The Executive Engineers at district will ensure completion of all necessary tasks within the stipulated time against each steps of planning and implementation of this programme and furnish all relevant information/report to Maintenance Cell at LGED HQ, Dhaka. The annual work schedule for maintenance of Rural Road and Structure Maintenance Programme under GoB revenue budget is furnished below.

- Last date of completion of Road & Structure Condition Survey, Roughness on BC Road, Traffic Survey, DCP/Deflection etc. by Executive Engineer's office: **15th August**

- Last date of compilation of Up-dated Road Inventory through RSDMS-V at district Executive Engineer's office: **21st August**
- Last date of preparation of Maintenance Need Assessment including Priority of Primary Scheme List generated from RSDMS-V in light of Up-dated Road Inventory by district Executive Engineer and send to Upazila office: **7th September**
- Last date of submission of Final Scheme List generated from RSDMS-V including cost estimate, priority and other necessary papers for approval from Upazila Development & Coordination Committee to Executive Engineer's office: **30th September**
- Last date of submission of Final Scheme List through District Maintenance Committee generated from RSDMS-V to Regional Superintending Engineer by District Executive Engineer's office**: 15th October**
- Last date of checking/verification including certify by Regional Superintending Engineer on Final Scheme List to RIMMU**: 31st October**
- Last date of submission of procurement plan to RIMMU: **31st December**
- Last date of awarding Work Order including processing of Tenders: **31st December**
- Physical Work Start Date: **Within 28th February**
- Physical Work Completion Start Date: **Within 31st May**
- Submission of Closure Report generated from RSDMS-V to LGED HQ: **Within 30th June**

Pavement Evaluation & Selection of Alternative Maintenance Option

1. Introduction

This document gives guidance on road pavement evaluation procedures suitable for bituminous-surfaced roads in tropical and sub-tropical climates and reviews alternative methods of maintenance and repair. It is intended primarily for road engineers who are responsible for maintaining roads in tropical and sub-tropical environments but the techniques and principles on which it is based are equally applicable in other environments. In addition, roads in many countries often suffer from accelerated failures caused by variable quality control during construction (lack of good road pavement materials), high axle loads and inadequate funding for maintenance.

This document describes methods of pavement evaluation designed to establish the nature, severity and extent of the road deterioration. It gives guidance on the use of non-destructive and destructive pavement tests and describes how the results of these tests can be interpreted,
both to identify the causes of the deterioration and to assess the strength of the existing road. It also reviews alternative rehabilitation design procedures and comments on their limitations and advantages.

2. Pavement Evaluation and Maintenance Procedure

The process of selecting appropriate methods of maintenance or rehabilitation is shown in Figure-1 and can be summarised as follows:

- Collect and interpret existing design, construction and maintenance data.
- Carry out surface condition, roughness and traffic surveys.
- Carry out structural and materials testing.
- Establish the cause of the pavement deterioration.
- Select appropriate method of maintenance or rehabilitation.

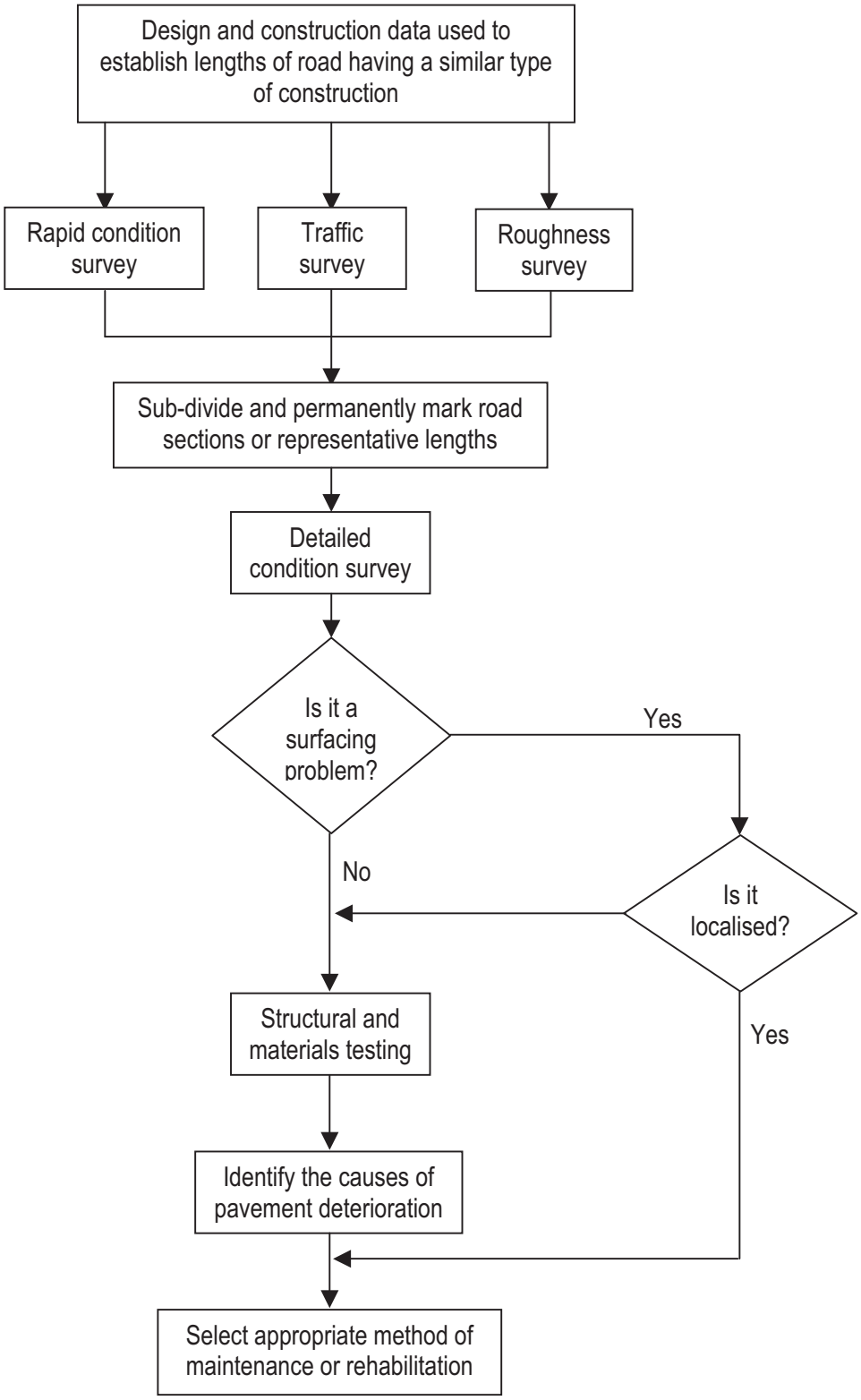


Figure 1: Road Pavement Evaluation and Rehabilitation Procedure

3. Interpretation of Existing Data

Design, construction and maintenance data, if available, can be used to establish the type and approximate thickness of the pavement construction. Using the data, those lengths of road having the same nominal thickness and type of construction are identified. Each length of road is then treated as a separate evaluation exercise.

The traffic loading (in terms of equivalent 8160 kg standard axles (esa)) that the road pavement has carried since its construction should be calculated (TRL, 1993b). Often, historical traffic counts are available but reliable axle load data will not have been collected. If neither classified traffic counts nor axle load data are available then surveys should be carried out as part of the evaluation exercise in order to establish current values. Techniques for carrying out such surveys are described in later in this document. If historical traffic data are available, the total commercial traffic loading that the road has carried since construction can be estimated. If this information is not available then the total traffic loading to date can be estimated using traffic growth rates based on other information.

It is important that, wherever possible, axle load data should be separated by direction of traffic as any differences in axle loads can be useful in identifying the causes of pavement deterioration. Significant differences can occur on roads that lead to quarries or major ports where, for example, raw materials are being exported or imported.

4. Surface Condition Survey

Ravelling:

The loss of chippings from a surface dressing resulting from poor adhesion between the binder and the aggregate appears early in the life of the surfacing. It starts in the wheel paths but, with time, the problem may spread across the carriageway making it difficult to differentiate between this type of failure and bleeding. However, it can often be identified by an accumulation of drippings at the edge of the road pavement. The rating of the defect is recorded according to Table 1.

Table 1 Rating of Bitumen Surfaced Pavement

Type of Defect	Percentage of Area Damaged			
Potholes	<1%	1% - 5%	5.1% - 15%	>15%
Cracking	<2.5%	2.5% -12.5%	12.51% - 25%	>25%
Depression	<1%	1% - 5%	5.1% - 15%	>15%
Edge Distress	<1%	1% - 5%	5.1% - 15%	>15%
Ravelling/ Delamination	<2.5%	2.5% - 7.5%	7.51% - 15%	>15%
Wheel Track Rutting	<2.5%	2.5% - 5%	5.1% - 15%	>15%
Rating	1	2	3	4
Total Score for Rating	6 - 9	10 – 15	16 - 21	> 21
Classification	Good	Fair	Poor	Bad

Cracks:

The assessment of cracking should fulfill two objectives. Firstly, it should identify whether the road pavement is suffering from load or non-load associated distress. Secondly, it should establish whether the severity of cracking will affect the performance of any subsequent new pavement layer

by causing reflection cracking. These objectives are best achieved by identifying four characteristics of the cracking:

- Type
- Position
- Width
- Extent

Type

Although there is often no single cause for any type of crack, its appearance can provide a guide to its likely cause. It is recommended that five types of crack are defined. These are listed as follows.

L - longitudinal cracks
T - transverse cracks
B - block cracks
C - crocodile cracks
P - parabolic cracks

Position

The position of the cracking is recorded. The cracking can be confined to either or both of the verge side (V) and offside (O) wheel paths, or can be spread over the entire carriageway (C/W).

Width

The measurement of crack width is difficult, but it is important because the width partly determines whether a crack can be sealed effectively. Two categories are recommended as shown below. The width of the cracks usually vary within any block, and so it is the width of crack that predominates that is recorded.

1 - crack width < 3mm
2 - crack width > 3mm

Extent

The rating of the cracking is defined as the length of block affected as shown in Table 1.

Rutting

Rutting is load associated deformation and will appear as longitudinal depressions in the wheelpaths. It is the result of an accumulation of non-recoverable vertical strains in the pavement layers and in the subgrade. This type of rutting is not associated with any shoving in the upper layers of the pavement unless it becomes very severe.

The width of the running surface and the traffic flow govern the number of observable wheelpaths on paved roads. For example, a 3-metre carriageway will have two wheelpaths but at road widths greater than 6.5 metres there are generally four. At intermediate widths and low traffic flows there is the possibility of three wheelpaths, with the central one being shared by traffic in both directions. Rut depths should be recorded in the wheelpath showing most rutting. On most roads this is usually the vergeside wheelpath because here the road pavement is generally weaker as a result of higher moisture contents and less lateral support.

Rutting can also be the result of shear failure in either the unbound or the bituminous pavement layers resulting in shoving at the edge of the road pavement. Where the shear failure is occurring in the unbound roadbase or sub-base the displaced material will appear at the edge of the surfacing. Where the failure is occurring in the bituminous material, the displaced material will be evident in the surfacing itself. This is illustrated in Figure 2. The severity of the shoving is difficult to measure without taking levels.

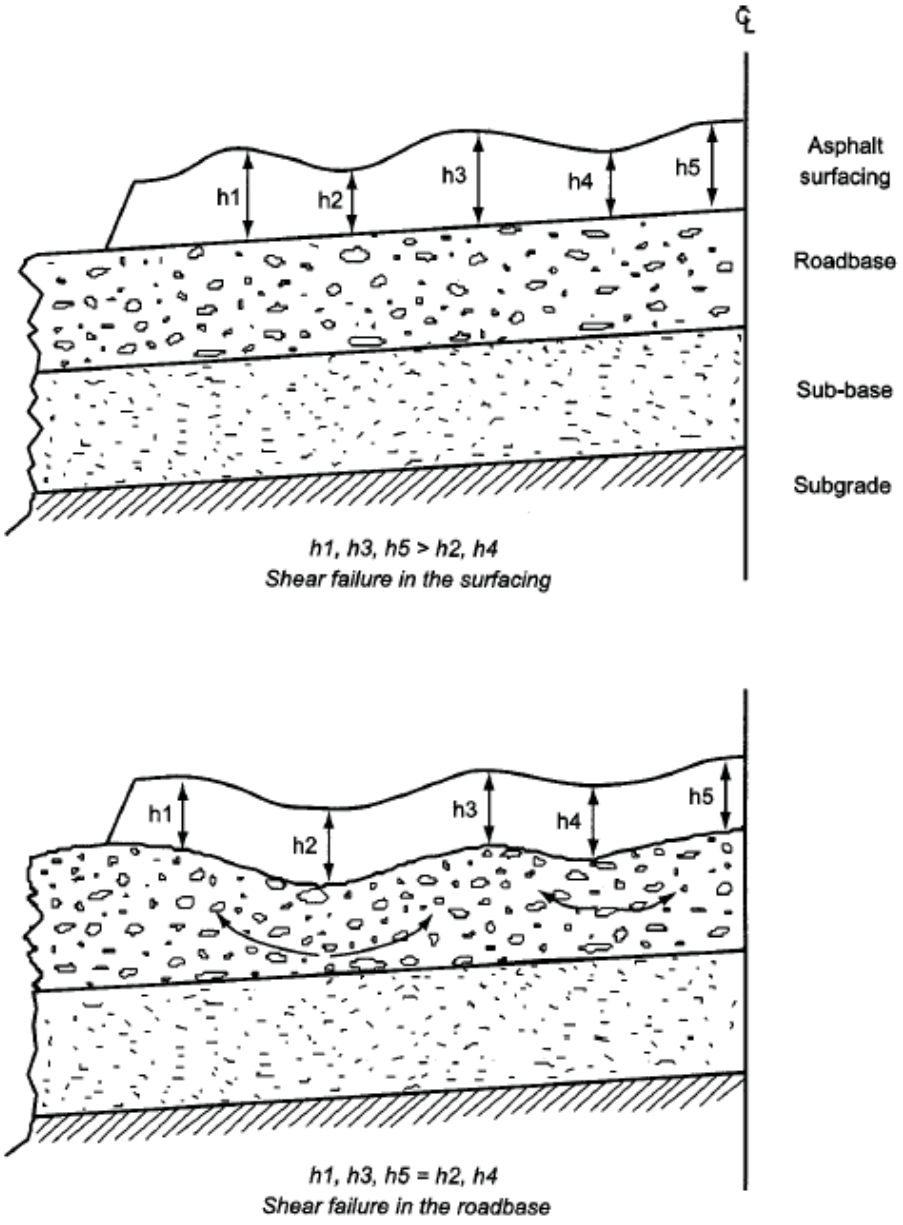


Figure 2 Transverse core profile to investigate rutting

Depressions

Localised depressions, caused by settlement of the pavement layers, construction faults and differential movement at structures, particularly culverts, should be recorded. These are easy to see after periods of rain as they take longer to dry than the rest of the road.

Corrugations

Corrugations consist typically of a series of ridges perpendicular to the centre line of the road and usually extend across the whole width of the carriageway. Their spacing, or wavelength, is usually in the range of 0.5-1.0 metre but can, in some circumstances, be as much as 10 metres. In paved roads they are caused by instability in either the asphalt surfacing or in an unbound roadbase under a thin seal. There is generally no need to measure the severity of the corrugations as it will not affect the selection of the remedial treatment. The extent of the defect is measured by roughness survey.

Potholes

Potholes are structural failures which include both the surfacing and roadbase layer. They are usually caused by water penetrating a cracked surfacing and weakening the roadbase. Further trafficking causes the surfacing to break up and a pothole develops. Because of the obvious hazard to the road user, potholes are usually patched as a matter of priority. Although patches are not necessarily defects, they do indicate the previous condition of the road and are included in the assessment.
The rating of potholes is recorded according to Table 1

Edge failures and shoulder erosion

Edge failures are caused by poor shoulder maintenance that leaves the surface of the road pavement higher than the adjacent shoulder. This unsupported edge can then be broken away by traffic, narrowing the running surface of the road. Edge failures (F) are recorded when they exceed 150mm in width at their maximum point or when the vertical step from the surfacing to the shoulder is greater than 50mm (S). The length of the road affected is recorded according to Table 1.

Deterioration caused by poor drainage

Localised pavement failures are often caused by the poor design or maintenance of side and cut-off drains and cross drainage structures. When side drains and culverts silt up, water ponds against the road embankment eventually weakening the lower pavement layers. Conversely, if the water velocity in the side drain is too high it erodes the road embankment and shoulders. More general failures occur when there is no drainage within the pavement layers themselves.

5. Localised surfacing defects

After the surface condition survey has been completed, the engineer interprets the results, decides where repairs are needed and what form of maintenance is required. To do this effectively the engineer must first identify the causes of the deterioration. This is important as it is likely that treating the symptoms of pavement deterioration rather than their causes will prove unsatisfactory. When the road pavement is either rutted or cracked, a programme of additional testing is usually required to establish the causes. However, there are some surfacing defects, if localised, which can be treated at this stage without the need for further testing. Suggested treatments for these types of pavement distress are summarised in Tables 2 and 3.

Table 2 Surface defects – roads with thin bituminous seal

Defects	Extent	Maintenance treatment	Notes
Ravelling	<15%	Local patching	A fog spray may be sufficient to rejuvenate the surface and prevent further raveling
	>15%	Surface dressing or slurry seal	
Cracks (Except transverse	<12.5%	Local patching	A fog spray may be sufficient to rejuvenate the surface and prevent further raveling

Defects	Extent	Maintenance treatment	Notes
cracks)			
	>12.5%	Surface dressing or slurry seal	
Potholes	Any	Patch	Potholes are the result of other failure such as cracking and deformation and additional tests will usually be necessary
Edge failures	Any	Patch road and reconstruct the shoulder	

Table 3 Surface defects – roads with asphalt surfacing

Defects	Extent	Maintenance treatment	Notes
Ravelling	<7.5%	Local patching	Application of a proprietary may rejuvenator may prevent further raveling
	>7.5%	Patching followed by surface dressing or slurry seal	
Cracks (Except transverse cracks)	<12.5%	Local patching	Application of a proprietary may rejuvenator may prevent further raveling
	>12.5%	Patching followed by surface dressing or slurry seal	
Potholes	Any	Patch	Potholes are the result of other failure such as cracking and deformation and additional tests will usually be necessary
Edge failures	Any	Patch road and reconstruct the shoulder	

6. Performance charts

Apart from the surface defects described in Tables 2 and 3, bituminous surfaced roads will generally deteriorate either by rutting or by cracking. It is important that the initial form of deterioration and its cause is identified, because this determines the type of maintenance that is most appropriate. After further trafficking, the initial cause of deterioration can be masked by subsequent deterioration. An illustration of this is shown in Figure 3, where the final appearance of the road deterioration is similar despite having different initial causes. It is also important to establish if the failures are localised, perhaps because of poor drainage, or whether they are affecting the road in a more general manner.

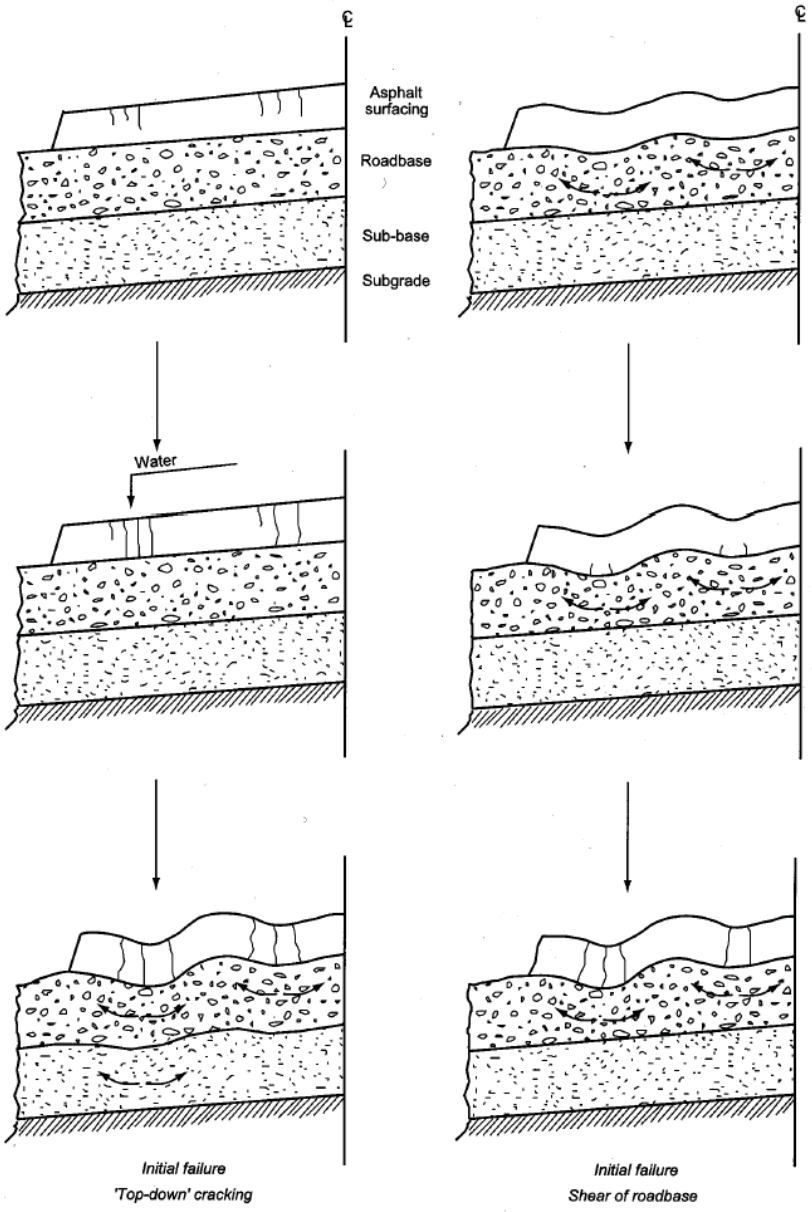


Figure 3 The development of road failure

When an evaluation takes place there will often be considerable lengths of road that have reached a terminal level of deterioration similar to that shown in Figure 3. However, even within nominally uniform sections, road

pavements are inherently variable, having a range of pavement thickness and material properties. This results in differential performance, with some areas deteriorating less rapidly than others, and it is in these areas that the initial form of deterioration can be most easily identified.

The cracking or rutting recorded during the windscreen or detailed condition survey may be displayed graphically in the form of performance charts. These enable the length of road affected by each form of deterioration to be quantified. The cracking and rutting can also be compared to other predominant forms of deterioration and this may help to promote a better understanding of the causes.

An example of the use of performance charts is illustrated in Figure 4 for a 20km section of paved road having a mechanically stabilised gravel roadbase with a thin bituminous surfacing. The initial form of deterioration was rutting which was associated with shoving whenever the failure became severe. Although there is some cracking which is coincident with high values of rutting, there is no cracking in areas of less severe rutting, suggesting that the rutting preceded the cracking. In addition to the rutting, substantial lengths of the surfacing are suffering from bleeding. However, the charts show that there is no correlation between the bleeding and the rutting, indicating that the shoving is in a lower granular layer, not the bituminous surfacing.

Using performance charts similar to those described above, the section is divided into subsections having failures of differing severity. A programme of additional tests is then prepared to identify the causes of the differential performance between the sub-sections. There may be some cases where the complete section of road will have reached a failed condition, for example when the road pavement has been under designed or where there are serious material problems. In such cases the cause of the deterioration can only be established by comparing the thickness of the road pavement or the material properties of the pavement layers with relevant design standards and material specifications.

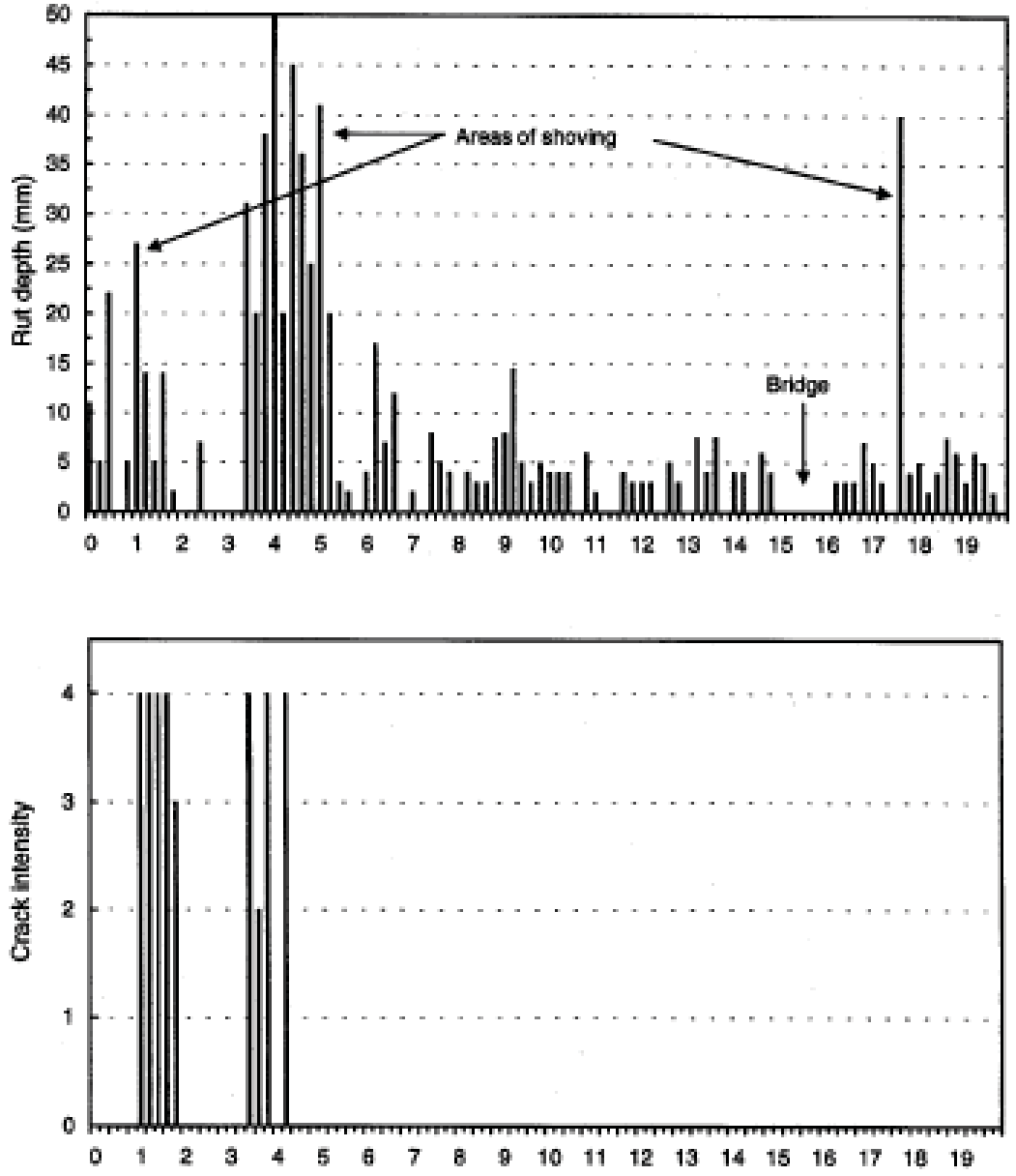


Figure 4 Illustration of performance charts

7. Additional tests

Deflection-based measurements and Dynamic Cone Penetrometer (DCP) tests are used to help identify the cause of differential performance between sub-sections and to provide information for the maintenance or rehabilitation of the section. In some cases the moisture content of the road pavement, especially the subgrade, changes seasonally. In these circumstances the tests should be carried out after the rainy season, when the road is at its weakest. The results from these non-destructive tests are usually confirmed by destructive sampling and material testing.

Deflection tests

The strength of a road pavement is inversely related to its maximum vertical deflection under a known dynamic load. Table 4 lists the more common deflection devices, their loading regimes and output.

Table 4 Deflection devices

Device	Type of applied load	Output
Deflection Beam	Moving Wheel	Maximum Deflection
Deflectograph	Moving Wheel	Deflection Bowl
Road Rater	Vibratory Load	Deflection Bowl
Dynaflect	Oscillatory Load	Deflection Bowl
Falling Weight Deflectometer	Impact Load	Deflection Bowl

The least expensive of these instruments is the deflection beam. This is a mechanical device that measures the maximum deflection of a road pavement under the dual rear wheels of a slowly moving loaded lorry. TRL recommends the use of a 63.2 kN rear axle load, other authorities recommend different loads, most commonly 80 or 100 kN. Over this range of loads the maximum deflection is usually linearly related to the applied load. Therefore, for structurally adequate pavements where over-stressing is not a danger, deflection values can be measured with these higher loads and then normalised to any standard load for comparison purposes.

Dynamic cone penetrometer tests
The DCP is an instrument which can be used for the rapid measurement of the in situ strength of existing pavements constructed with unbound materials. Measurements can be made down to a depth of approximately 800mm or, when an extension rod is fitted, to a depth of 1200mm. Where pavement layers have different strengths, the boundaries between them can be identified and the thickness of each layer estimated.

DCP tests are particularly useful for identifying the cause of road deterioration when it is associated with one of the unbound pavement layers, eg. shear failure of the base or sub-base. A comparison between DCP test results from subsections that are failing and those that are sound will quickly identify the pavement layer which is the cause of the problem.

Destructive sampling and material testing
5.6 When deflection measurements and DCP results indicate that either the thickness or properties of the lower pavement layers are the cause of the differential performance, then test pits are needed to obtain additional material information to confirm these results. These investigations are used both to provide an explanation for the present behaviour of the pavement and to provide information for its rehabilitation. Each test pit will provide information on the thickness of each pavement layer and properties of the material. These can then be compared to specified values.

8. Identifying the causes of pavement deterioration

The next stage in the evaluation procedure is to establish the cause or causes of the pavement deterioration by interpreting the data collected during the surface condition survey and the additional testing. The causes of deterioration combined with the extent of the failures must be considered together when selecting the most appropriate method of maintenance or rehabilitation.

Besides the surface defects described in Tables 2 and 3, bituminous surfaced roads will generally deteriorate either by rutting or by cracking. To help identify the cause of the deterioration, rutting and cracking have been subdivided into three categories based on the nature of the failure, its position and the type of road construction. These are:

- rutting without shoving;
- rutting with shoving; and
- cracking - asphalt surfacing/ thin bituminous seal;

A method of establishing the probable cause or causes of pavement deterioration is given in the flow charts shown in Figures 5.1-5.5. These charts will not cater for all the types and stages of pavement deterioration. In particular, when a road has received a series of maintenance treatments or when the initial deterioration is masked by further progressive failures, the problem of identifying the initial cause of failure becomes more complex. However, the charts do provide a framework that enables highway engineers to develop their own pavement evaluation skills. The charts identify general causes of deterioration but do not attempt to establish specific material problems, as this can only be done by further destructive sampling and subsequent laboratory testing.

Rutting without shoving (Figure 5.1)

These ruts are usually wide as they are caused primarily by movement deep in the pavement structure, and there will be little or no evidence of shoving at the edge of the pavement. This type of rutting is the result of two possible causes, either insufficient load spreading or secondary compaction.

Insufficient load spreading is the result of the pavement layers being too thin to protect the subgrade. It is characterised by an increase in rutting with traffic loading. Where there is historical data on the progression of rutting and traffic, or where there is a significant difference in traffic loading between the two lanes, then this relationship can be established. More usually this information will not be available and it will then be necessary to show a relationship between the severity of rutting and the deflection of the road pavement at the time of the evaluation. If deflection equipment is unavailable, a similar analysis can be completed by relating the severity of rutting to the strength of the road, as measured by the DCP.

If the severity of rutting does not relate to the strength of the road pavement, the most likely cause of the rutting is secondary compaction of one or more of the pavement layers by traffic during the early life of the road. In this case the rate of increase in rutting will decrease after the initial compaction phase.

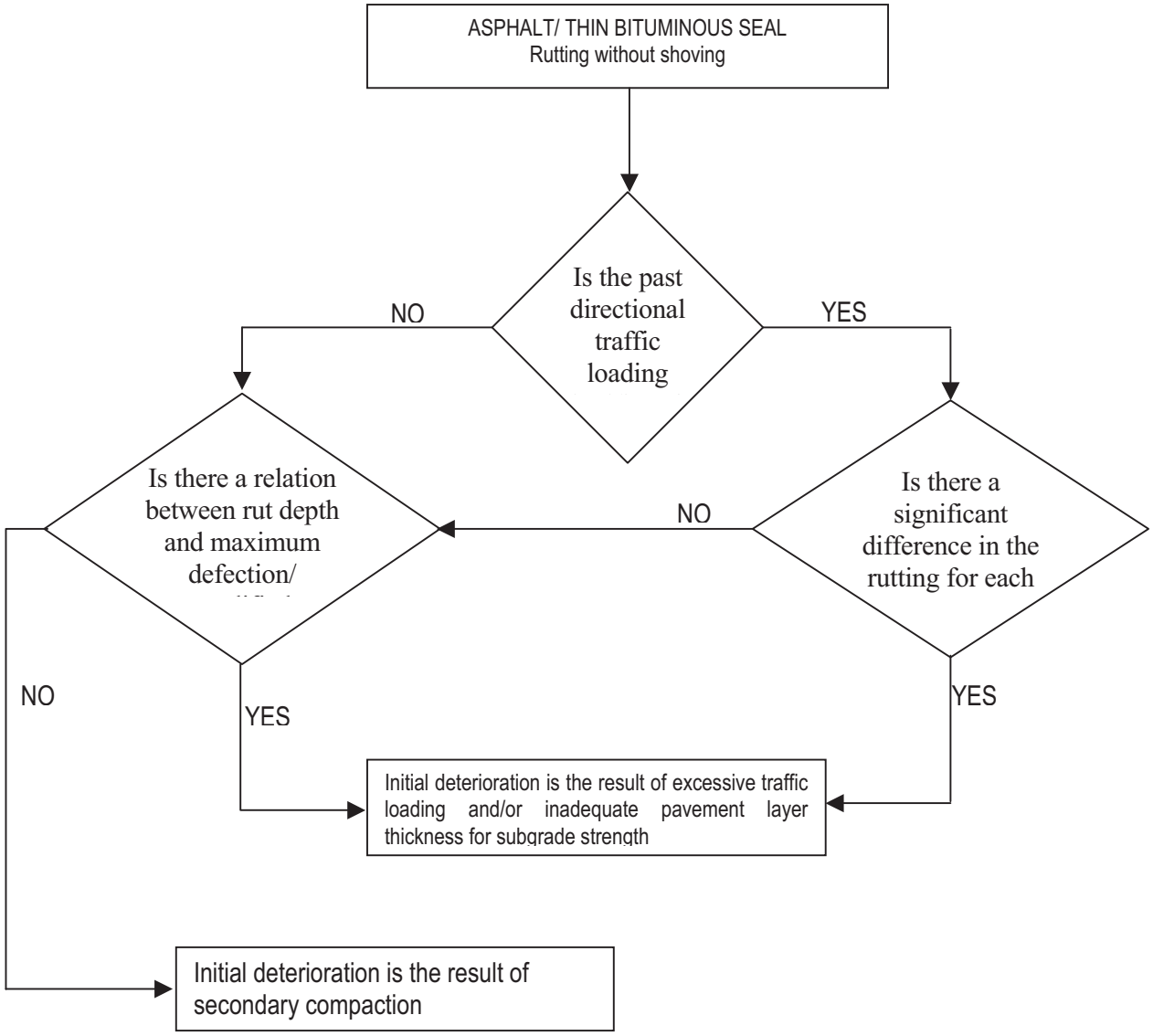


Figure 5.1 Initial deterioration - Rutting without shoving

Rutting without shoving (Figure 5.2)

Shoving parallel to the edge of the rut is indicative of a shear failure in one of the pavement layers and is caused by the pavement layer having inadequate shear strength to withstand the applied traffic stresses at that particular depth in the pavement. Unlike the rutting described in previous paragraph, the severity of the rutting will not usually be related to the overall strength of the pavement as indicated by either its deflection or modified structural number.

The failures are usually confined to the upper pavement layers where the applied traffic stresses are at their highest. A process of elimination is used to identify which layer has failed. If the pavement has an asphalt surfacing then a transverse core profile (Figure 1) can be used to establish in which bituminous layer, if any, the failure is occurring. If the failure is not in the asphalt surfacing then the DCP can be used to identify which of the underlying pavement layers is the cause of the failure. This is done by comparing the strength of the layers in failed areas with those that are sound.

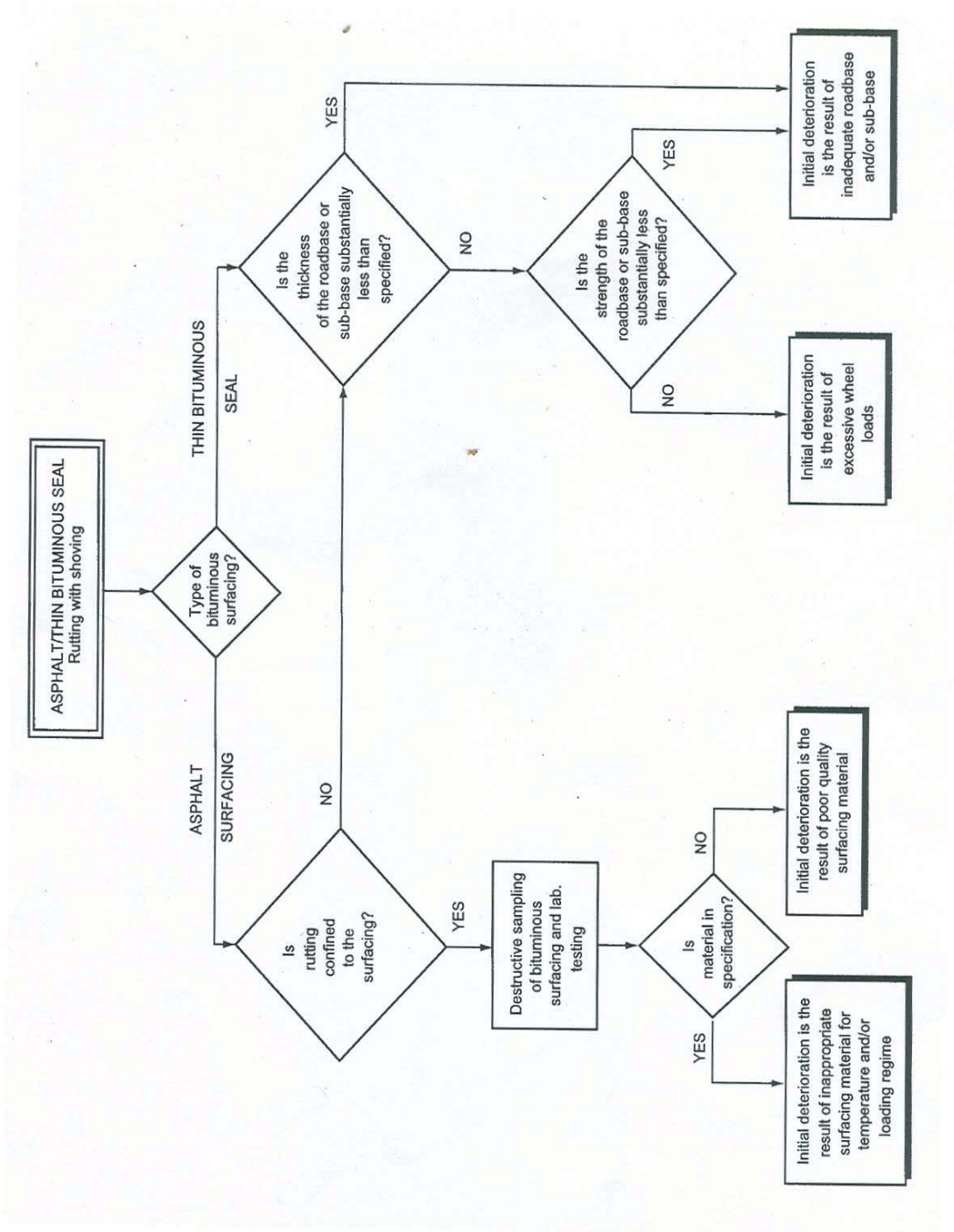


Figure 5.2 Initial deterioration - Rutting with shoving

Non-wheelpath cracking - asphalt surfacing

The cause of non-traffic associated cracking in an asphalt surfacing is largely established by identifying its type (see para cracks type). As traffic has played little or no part in these road failures the cracks will not be confined to the wheelpaths and there will not be any substantial rutting. Non-wheelpath cracking can take the form of longitudinal, transverse, block or crocodile cracking.

Longitudinal cracking (Figure 5.3)

Thermal stresses can cause cracks to appear along poor longitudinal construction joints and in areas of severe temperature gradients, such as the edge of road markings. In their early stages neither of these types of crack is particularly serious; however, if left unsealed, the cracks will eventually spread into the wheelpaths where they will result in more serious deterioration.

Where longitudinal and transverse cracks occur in combination, they are likely to be either reflection cracks propagating from a lower stabilised layer or cracks caused by thermal or shrinkage stresses in the asphalt. These are described in more detail paragraphs of Transverse cracking.

Longitudinal cracks caused by subgrade movement will generally be quite long and can meander across the carriageway. They can occur because of poor construction, swelling in plastic subgrade or embankment materials, and the settlement or collapse of embankments. Cracks caused by the slippage of an embankment will often occur in semicircular patterns and both these and cracks caused by subgrade movement will often be associated with a vertical displacement across the crack.

Transverse cracking (Figure 5.4)

Transverse cracks in the surfacing of a road pavement which includes either a chemically stabilized roadbase or sub-base are likely to be reflection cracks from the stabilised layer, particularly if the stabiliser is cement. This form of transverse cracking is often associated with longitudinal cracks and, in severe cases, block cracking.

If the transverse cracks are irregularly or widely spaced they are likely to have been caused by some form of construction fault. Differential vertical movement caused by consolidation or secondary compaction adjacent to road structures and culverts can cause transverse cracks in the surfacing. These cracks will be associated with a poor longitudinal road profile caused by the differential movement.

Block cracking (Figure 5.5)

Block cracking, when confined to the bituminous surfacing, is usually the final stage of cracking due to thermal stresses. These cracks almost always start at the top of the surfacing and propagate downwards. Block cracking can also occur through reflection of the shrinkage crack pattern in lower chemically stabilised layers.

Wheelpath cracking - asphalt surfacing

If cracking is caused primarily by traffic it must, by definition, originate in or near the wheelpaths. In severe cases it is sometimes difficult to be sure whether the failures start in the wheelpath or whether they are a progression of another form of cracking. Short irregular longitudinal cracks in the wheelpaths are often the first stage of traffic induced fatigue of the surfacing which, after further trafficking, interconnect to form crocodile cracks.

Where crocodile cracks are shown, by coring, to have started at the bottom of the asphalt layer, then they are likely to be `traditional' fatigue cracks caused by excessive strains at the bottom of the surfacing. Excessive strains can be caused by a weak subgrade, giving rise to large maximum deflections, or a weak roadbase leading to small radii of curvature. However, in both cases the cracking is frequently associated with rutting; in the former case, because of insufficient load spreading; in the latter case, because of shear failure in the roadbase. In practice this type of crocodile cracking very rarely occurs without any rutting.

Poor surfacing materials can also result in crocodile cracking. Inadequate quality control exercised during the manufacture and construction of dense surfacings can lead to poor particle size distribution, low bitumen contents, segregation and poor compaction, all of which will make the material more susceptible to cracking. Failures of this type can occur in areas where deflections are satisfactory and where little or no rutting is occurring. If the bond between the asphalt surfacing and the underlying layer is poor then the surfacing can effectively 'bounce' under traffic. This quickly results in crocodile cracking in the wheelpaths and is characterised by blocks of less than 200mm square. The cause of the poor bond can be ineffective priming of the roadbase, or deficient tack coat prior to placing an overlay. Often the cracking will progress to laminations, which are shallow potholes that are clearly the result of the surfacing `peeling' off.

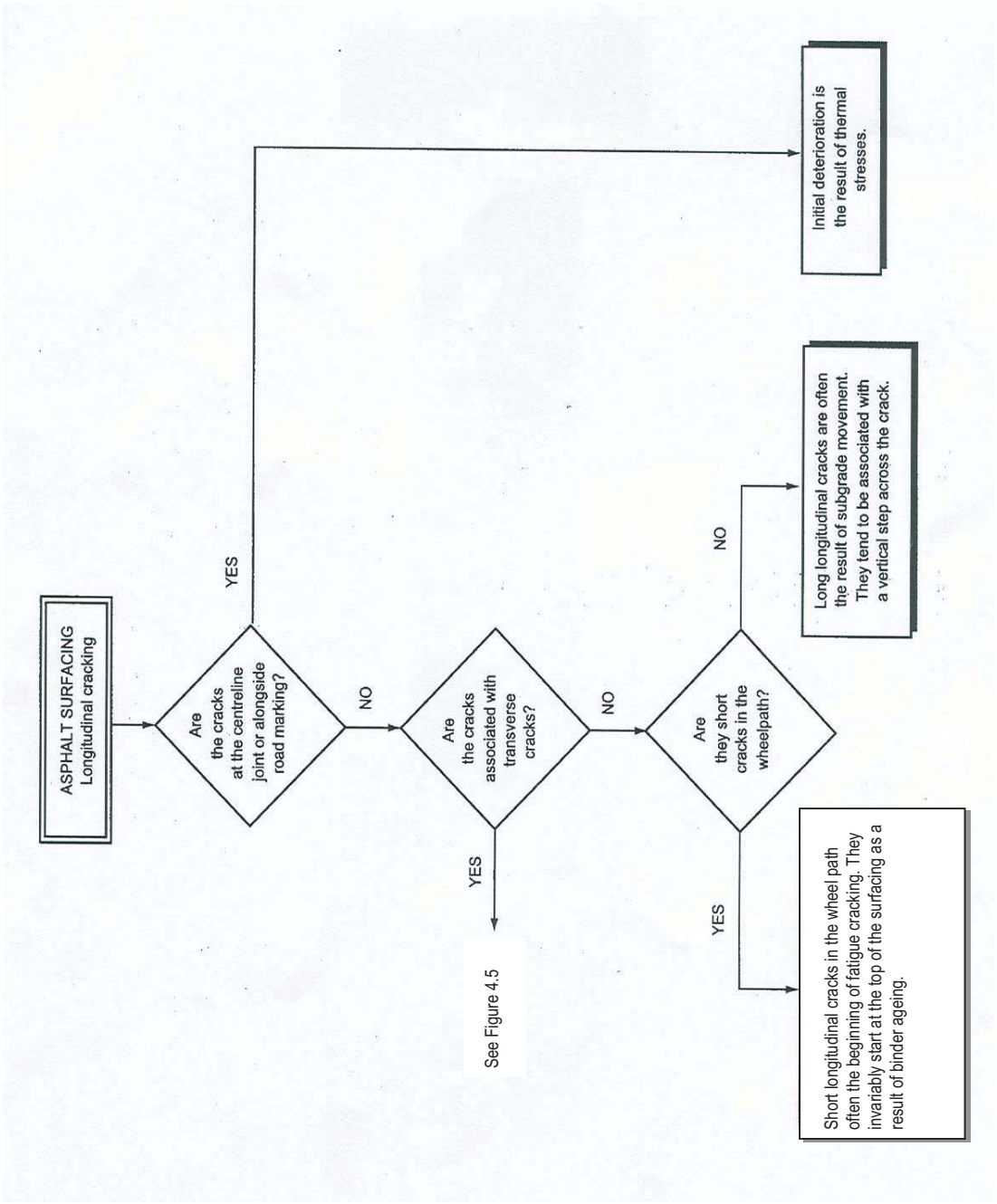


Figure 5.3 Initial deterioration – Longitudinal cracking in asphalt surfacing

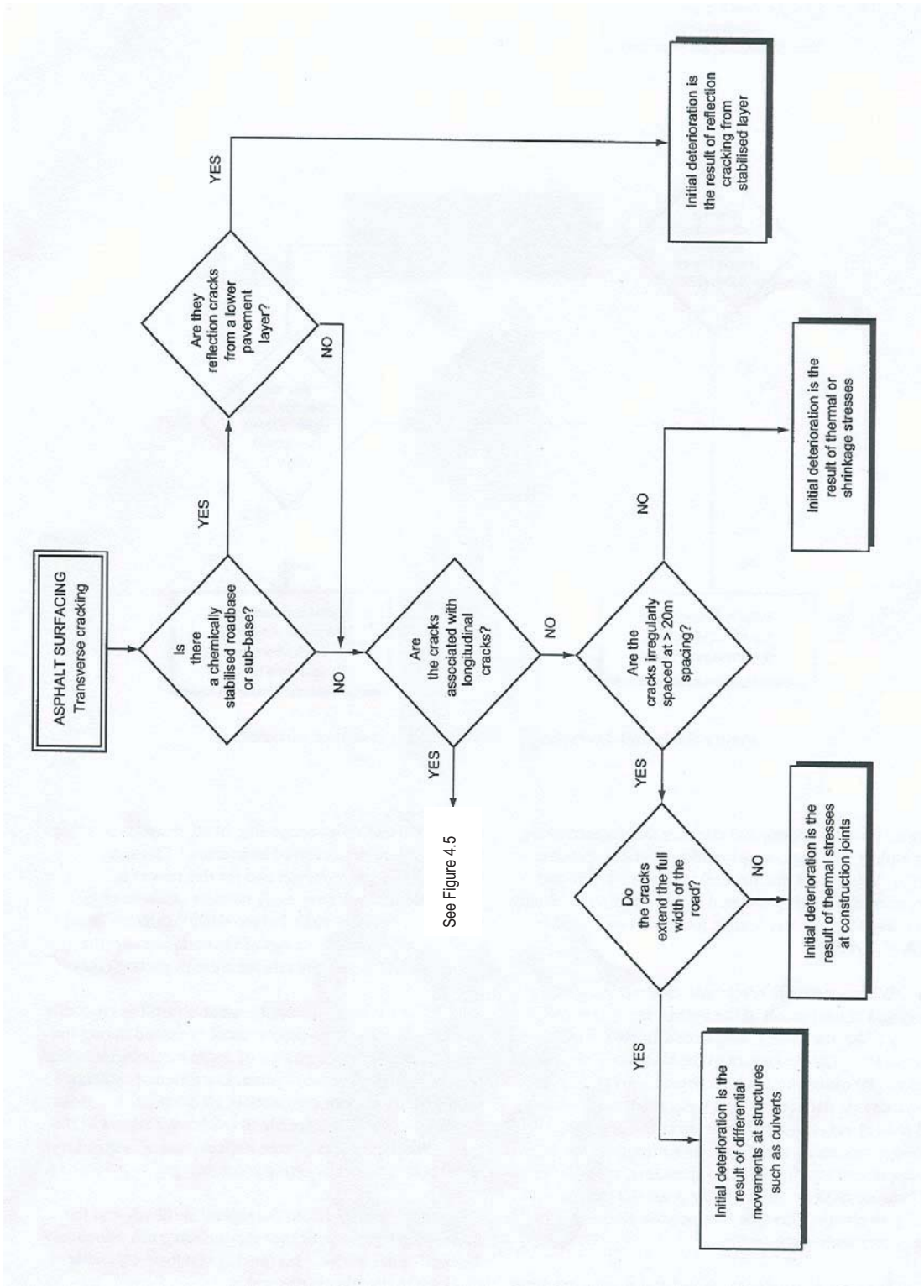


Figure 5.4 Initial deterioration – Transverse cracking in asphalt surfacing

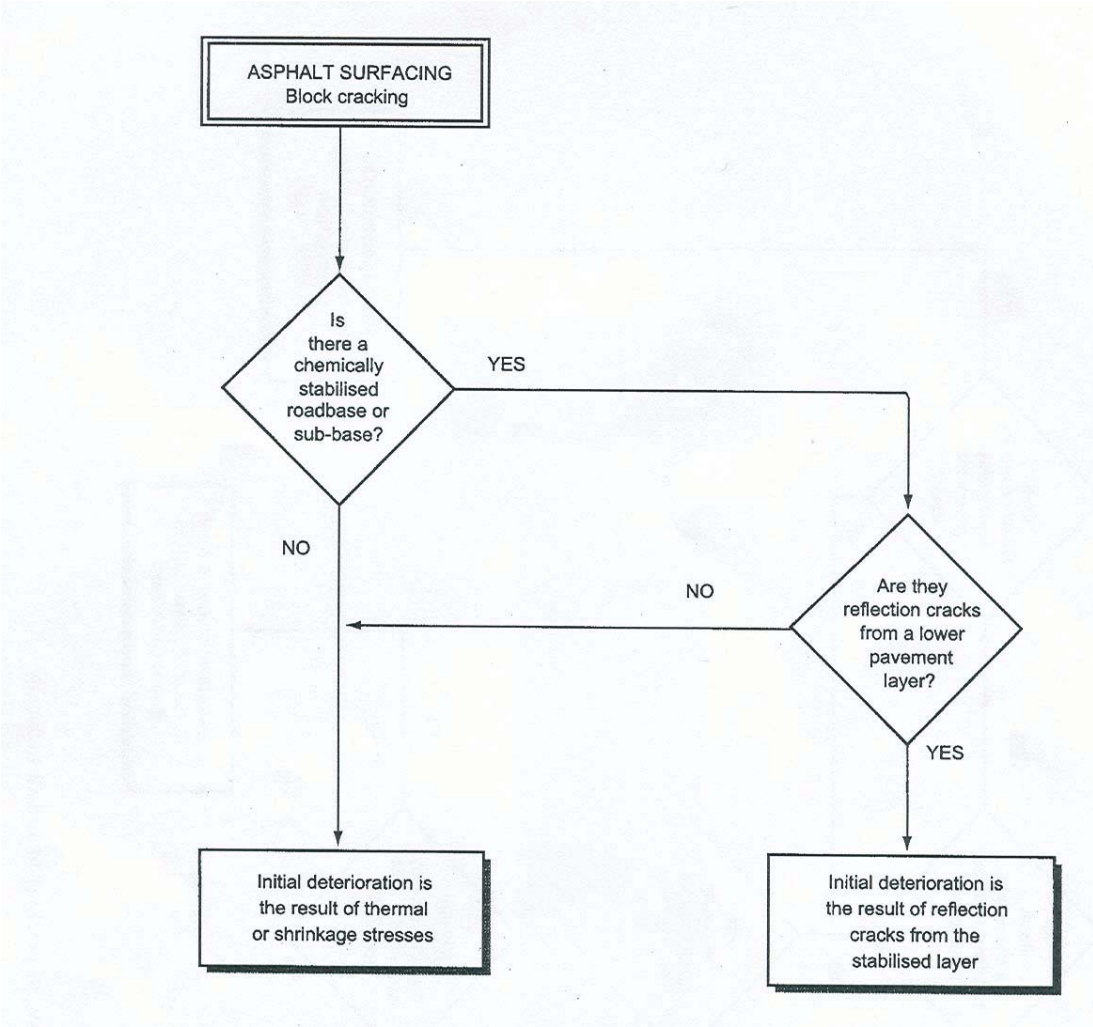


Figure 5.5 Initial deterioration – Block cracking in asphalt surfacing

9. Maintenance and Rehabilitation

The selection of an appropriate maintenance treatment or rehabilitation strategy is based on a number of considerations. Firstly, the cause of deterioration in the existing pavement must be correctly identified and its importance assessed. For example, the deterioration may result from some deep seated structural insufficiency or construction defect. In such cases consideration must be given to full or partial reconstruction of the pavement to correct the situation. Secondly, attention should be given to the nature, extent and severity of the deterioration to check what effect it will have on the treatments that are being considered. For example, thin asphalt surfacings on their own will not provide a satisfactory repair where reflection cracking is likely, nor will any form of thin surfacing provide a significant improvement to riding quality where this is poor. Finally, the strategy must be economically viable taking into consideration both the costs of maintenance and the vehicle operating costs over a number of years.

It should not be assumed that when a road is in poor condition it inevitably needs strengthening. When traffic is low, for instance, the existing road structure is often thick enough to prevent long term rutting. In this case the maintenance treatment selected should address the cause, or causes, of the deterioration without necessarily adding strength to the pavement. It is important, therefore, to check the ability of the existing road pavement to carry the predicted traffic loading using at least one of the methods described below. Where

either of the methods are shown to accurately predict the present performance of the road under study then the method is equally applicable for the design of strengthening works in the event that the road is shown to be too weak to carry the future traffic. The methods are as follows:

a. Analytical approach
b. Structural approach
c. Deflection approach

9.1 Structural approach

In this method the traffic carrying capacity of the road is estimated by comparing the existing pavement structure and its condition with established design charts. The thickness of the various pavement layers should first be established using the DCP and trial pits, and the in situ strength of the pavement layers and the subgrade determined by a combination of deflection and DCP data. These tests should be carried out shortly after the wettest period of the year, when the pavement can be expected to be in its weakest condition. If this is not possible, adjustments will need to be made to the deflection data and material properties to reflect the season during which the data were collected. The in situ strengths of the pavement layers obtained in this way, in particular the upper granular layers, should always be verified by laboratory tests to ensure they conform to normally accepted specifications. The effective structural number of the pavement can then be obtained by using techniques described in the AASHTO Guide for Design of Pavement Structures (AASHTO, 1993).

The required strengthening measures are then established by comparing the effective structural number of the pavement with the required structural number of a pavement for the future traffic, obtained from an appropriate design method, at a representative value of in situ subgrade strength. If the AASHTO guide is used then a mean value of the resilient modulus of the subgrade, suitably corrected (AASHTO, 1993), is used. If Road Note 31 is preferred then the lower 10 percentile of the in situ subgrade CBR should be used, measured when the pavement is in its weakest condition. Where the comparison of the effective structural number, past traffic and design recommendations is shown to be consistent with the present condition of the road pavement, then the engineer can be more confident in designing the thickness of any necessary strengthening overlay by this method.

9.2 Maintenance options

If it is established that the road does not require strengthening, the method of maintenance should be based upon the type of the existing surfacing and the cause of failure. Pavement maintenance will generally result in two operations. Firstly, those areas where failure has already occurred should be repaired by some form of remedial treatment and, secondly, the road should generally be resurfaced to prevent other lengths failing in a similar manner. Suggested methods of maintenance for the different types of pavement deterioration for roads having thin bituminous seals and asphalt surfacing are given in Tables 4 and 5 respectively.

Table 4 Surface defects – roads with thin bituminous seal

Primary failure	Remedial treatment	New surfacing	Comments
Ravelling	Local patching	Surface dressing or slurry seal	
Rutting/ Depression			
Secondary compaction		Thin overlay	

Primary failure	Remedial treatment	New surfacing	Comments
Excessive traffic loading or inadequate thickness		Regulating layer followed by a strengthening overlay	
Inadequate Road Base			
Too thin	Remove surfacing and increase road base thickness with granular overlay	Double surface dressing (carpeting + seal coat)	
Too weak	Remove surfacing replace or modify existing road base	Double surface dressing (carpeting + seal coat)	Existing road base may be suitable for mechanical stabilization or modification with lime or cement.
Inadequate Road Sub-Base			
Too weak			Regard sub-base as Improved sub grade and redesign pavement accordingly.
Cracking			
Poor bond	Remove surfacing where the bond is poor and patch		
Sub grade movement	Immediate chase out and seal all cracks to prevent the ingress of water		Pavement should be sealed with a double surface dressing after crack development has stabilized.

Table 5 Surface defects – roads with asphalt surfacing

Primary failure	Remedial treatment	New surfacing	Comments
Ravelling	Local patching	Surface dressing or slurry seal	
Rutting/ Depression			
Secondary compaction		Thin overlay	
Excessive traffic loading or inadequate thickness		Regulating layer followed by a strengthening overlay	

Primary failure	Remedial treatment	New surfacing	Comments
Inadequate Road Base			
Too thin	Remove surfacing and increase road base thickness with granular overlay	Asphalt surfacing	
Too weak	Remove surfacing replace or modify existing road base	Asphalt surfacing	Existing road base may be suitable for mechanical stabilization or modification with lime or cement.
Cracking			
Cracks confined to the top of the surfacing		Double surface dressing (carpeting + seal coat)	
Poor bond	Remove affected surfacing and patch		Where the failures are extensive the surfacing will need to be removed and the road resurfaced with asphalt.
Poor surfacing material	Remove affected surfacing and patch		Where the failures are extensive the surfacing will need to be removed and the road resurfaced with asphalt.
Fatigue cracking	Remove affected surfacing and patch	Double surface dressing (carpeting + seal coat)	Where the failures are extensive check whether the road needs strengthening.
Longitudinal cracks			
At construction joints and road marking	Chase out cracks and seal		
Sub grade movement	Immediate chase out and seal all cracks		Pavement should be sealed with a double surfacing dressing after the crack development has stabilized.
Transverse cracks			
At construction joints and road marking	Chase out cracks and seal		
Thermal or shrinkage cracks	Chase out cracks and seal	Double surface dressing	
Block cracking			
Thermal or shrinkage cracks	Chase out cracks and seal	Double surface dressing	If block cracking is severe then the surfacing will need to be removed and replaced.

10. 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:

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

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

Where, ESA = Cumulative Standard Axles, for each type of vehicle (Truck, Bus, Minibus), in both 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 total number of commercial vehicles per day in both 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	298411
Truck Light	49	0.5			112477
Bus Heavy	33	0.5			75750
Bus Mini	59	0.2			54172
Other Vehicle	Negligible				Negligible
					540810

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 = 0.54 x 2 = 1.08 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

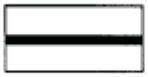
Traffic classes
(10^6 esa)

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

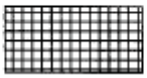

Double surface dressing


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

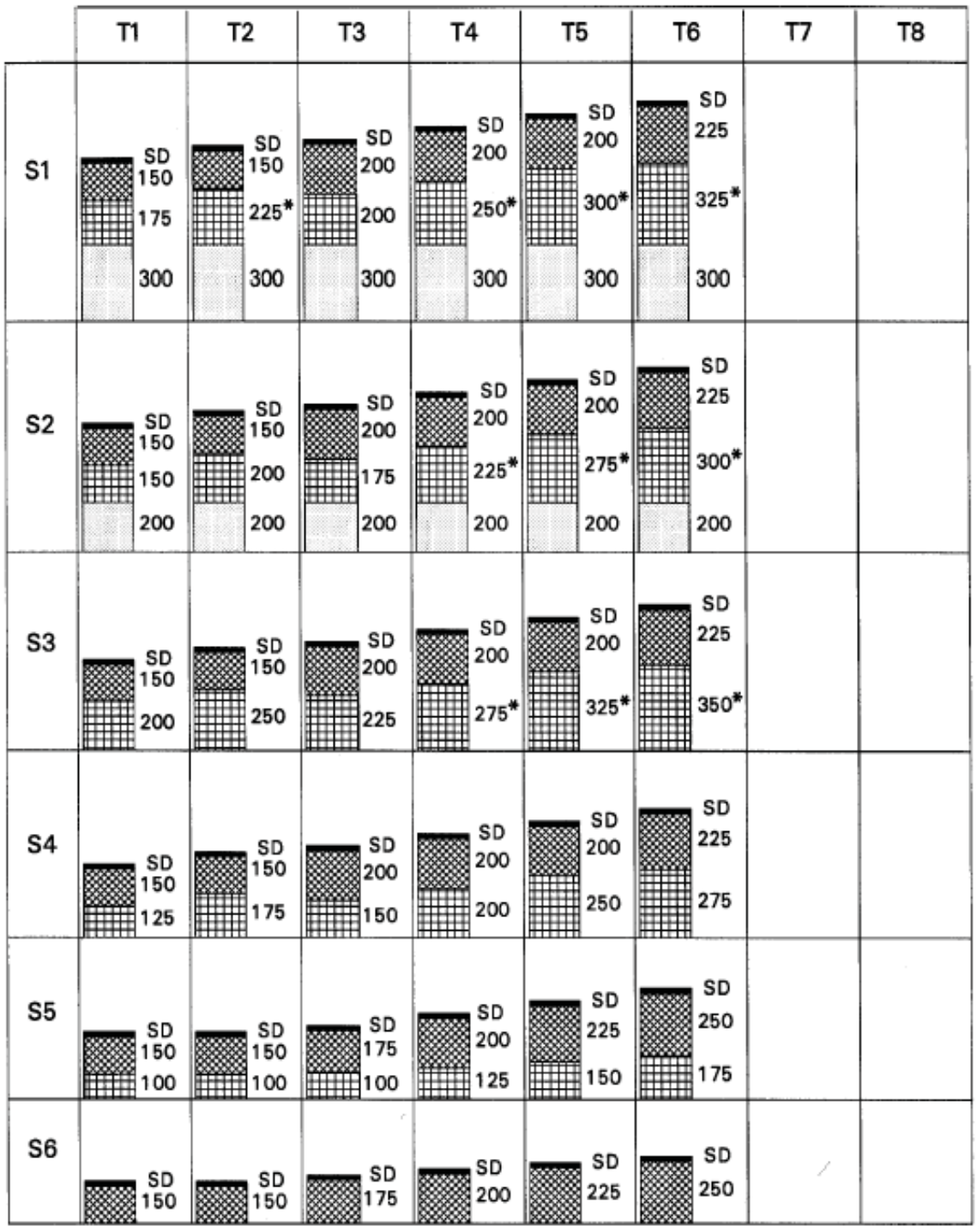

Granular capping layer or selected subgrade fill, GC


Cement or lime-stabilised roadbase 1, CB1


Cement or lime-stabilised roadbase 2, CB2


Cement or lime-stabilised sub-base, CS

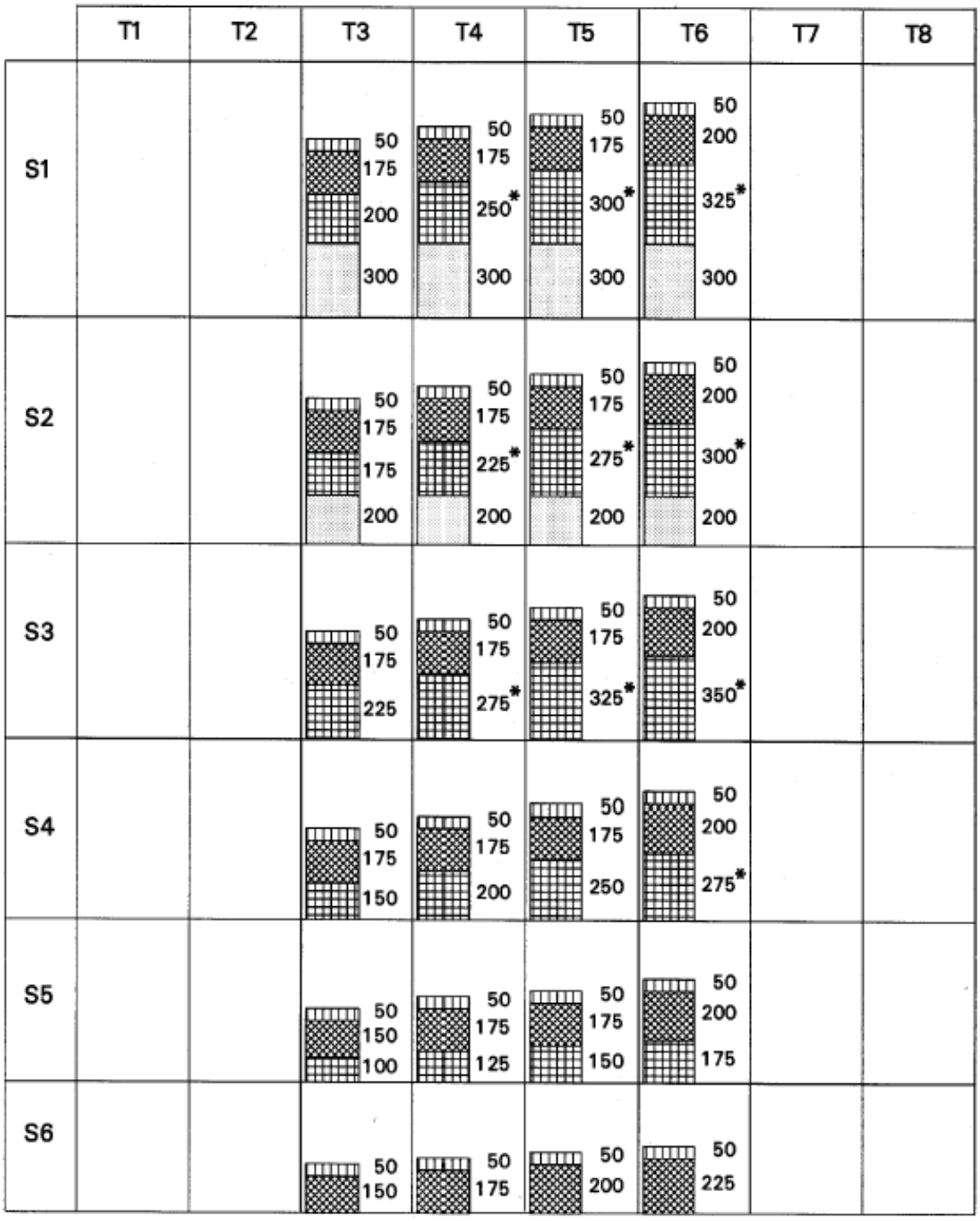
CHART 1 GRANULAR ROADBASE / SURFACE DRESSING



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



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.

SECTION-2
(Survey and Data Collection)

Road & Bridge Condition Survey

1. Road Condition Survey

1.1 General

A road is deigned for a specific period of time and constructed accordingly. For example, the design period could be 20 years and it would be constructed with proper standard. If anybody thinks that there will be no need of any maintenance work during the design life (20 years), it is not right. Each and every road requires maintenance. Routine maintenance should start immediately after its construction and continue on regular basis. Periodic maintenance will be done at certain intervals, usually starting 3-5 years after completion. By maintaining the road in this way it will be possible to reach its required design life and thereby ensuring the full benefits from economic point of view.

It is important to know the condition of the road every year for planning and implementing proper maintenance works. Accordingly road condition surveys are done to find out the condition and this should be done every year at a particular time.

1.2 Road Elements

The road embankment is built with earth in Bangladesh. Earth is filled and compacted layer by layer up to the required height. The pavement is constructed on the top for traffic movement. Earth at the bottom of the pavement is called the sub-grade. The sub-base and base course is placed in two or more layers over the sub-grade. Finally the surface course is placed on top of it. The shoulder on both sides of the pavement is for the pedestrian, light vehicle movement and for parking.

The pavement has a gradient towards both sides from the centreline of the road. This gradient is called the camber. Each embankment has side slopes on both sides according to the design. At the end of the embankment slope (toe), there is berm to keep the embankment stable.

1.3 Relevance of Road Inventory and Road Condition Survey

It is important at the beginning to distinguish between “road inventory” and “road condition survey”. Often the two terms are found occurring on the same form or report, or one term is used when the report concerns the other. In fact the two data collections are quite different and are used for different purposes even if they appear on the same summary report. Both are the important elements of Road Maintenance Management System (RMMS), by which relevant information is collected and represented in such a way that it can help the engineers/ planners to take decision in an effective and efficient manner.

A road inventory is simply a physical record of the road and the various elements associated with it. A road inventory, once first done, is relatively constant and will only need to be updated when changes are made to the road (e.g. an upgrade of the road surface, provision of hard shoulders, construction of bridges/ culverts, etc)

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A road condition survey on the other hand is constantly changing as the condition of the road and the elements associated with it also change. A road condition survey is the current record of the condition of the items included on the road inventory at the time of survey.

1.4 Importance of Road Condition Survey

The road condition survey is very important because it provides valuable information to the management at all levels. Fund for spending on road maintenance is limited and it is generally less than what is required, this means that it is important that fund is allocated according to the need and priority.

Road condition surveys have several purposes:

- to assess and record the condition of the road network
- to estimate the quantity and type of maintenance work needed

- to compare the condition of one road against another on the road network to be able to prioritise maintenance programmes
- to monitor rates of deterioration of road condition and to relate this to the original construction and design and the amount and kind of maintenance inputs applied.

First of all, it is necessary to get an overview of the condition of the road network as a whole. Is the condition of the network improving or getting worse? Is the objective of road maintenance being achieved in terms of efficiency and effectiveness? To get answer of these questions, it is necessary to compile a summary of the condition of all the roads in an Upazila, in a District and eventually for the whole LGED road network in the country.

Secondly, it is necessary to be able to identify and quantify the defects on each road in the network and relate these to their possible treatment and to be able to prepare a maintenance work programme. It is also necessary to assess the condition of each road so that work can be ranked in the order of priority to ensure that the most urgent and important work is undertaken first.

Thirdly, it is necessary to be able to monitor the condition of the road over a number of years so that the condition and the rate of deterioration of the road can be related to:

- the interval between periodic maintenance- reseal and overlay
- the amount and type of routine maintenance carried out, and
- the original construction design.

This is important, because it helps to take decision on the best type of construction to reduce the rate of deterioration (e.g. to what extent does the provision of hard shoulders save the failure of the carriageway due to edge breakages). It helps to decide when and where periodic maintenance (bituminous re-seal) is most needed and it also helps to find out the best maintenance treatment to be used in order to protect the road network and keep it in good condition.

2.0 Planning and Organising Road Condition Survey

Road Condition Survey basically means the collection of data concerning the quality of the road network. The frequency of collecting data should be at least once in a year to 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, described in this manual 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

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.

2.1 Road Condition Survey Team

To obtain uniform valuated quality data, the Upazila Engineer (UE) will constitute one or more teams (depending upon the amount of work involved) with the Upazila Technical Staff of LGED at each Upazila for survey of the bituminous road network of the entire Upazila. For initial planning of the work the following assumptions on performance may be useful:

Rapid Road Condition Survey (RRCS)	10 - 15 km/day
Detailed Road Condition Survey (DRCS)	3 - 5 km/day

After having performed a number of inspections the above rate may require adjustment based on local circumstances.

2.2 Documents

The following documents must be carried by the team at the time of inspection;

- Road Inventory (all bituminous Upazila road and Union road) of the concerned Upazila
- Upazila Road Map
- This manual
- RRCS/ DRCS Forms

2.3 Equipment and Instruments

The following equipment are required for inspection;

- Motorbike/ bi-cycle/ rickshaw-van to carry the team members,
- Measuring wheel/ measuring tape,
- Measuring rule (scale),
- Straight edge,
- Spirit level,
- Hammer and chisel,
- Clip board,
- Camera (optional)

3 Surface Distresses on Bituminous Road

3.1 General

Even when roads are constructed to the highest quality, over a period of time the road will show distress due to the effects of traffic wear, vehicle loads, climatic effects and other reasons. Road maintenance is therefore required on a regular basis to keep these effects to a minimum, extend the life of the road and provide a good service to the road users. Maintenance of all elements of the road is important but knowing the condition of the pavement is most important in predicting the performance of the road.

3.2 Common Defects

The first requirement is to establish the main defects that will indicate the condition of the pavement. These are the principal indices that provide important information in assessing the pavement condition and hence enable various options for maintenance to be determined. The most commonly occurring defects on rural roads are;

On bituminous pavement:

- Potholes
- Cracks
- Depressions
- Edge Failure
- Ravelling/ Delaminating
- Rutting

On road sides:

- Low hard shoulder
- Low earth shoulder
- Erosion/ rain-cut

3.3 Measurement of Defects

It is very important to fix a standard method of measuring the defects to assess the degree of seriousness of those defects. A defect is assessed in terms of extent (how large it is) and severity (how serious the damage is).

For example, regarding the defect of "potholes", the extent can be considered as the area of potholed surface, and severity would be the depth of the hole at its deepest point. If the assessment of extent and severity is combined, we have a standard means of recording the condition under the category of potholes. If this is done for each defect category, it is possible to combine all these to give a standard means of assessing the overall condition of the road.

The severity of the defect will have an effect on the assessment of the condition of the road. A road with 100 sq m of deep potholes is obviously in worse condition than a road with 100 sq m of shallow potholes. To take account of the effect of the severity of defects on the road condition, two ranges of severities are rated for simplicity. The first range of severity is rated as low (repair possible with single layer normally) and the second range as high (requires multiple layers to repair).

When assessing the condition of the road surface with regard to potholes in RRCS, it is necessary to measure the area of potholes having a maximum depth between 25 mm and 50 mm and the area having a depth greater than 50 mm.

The main defects relating to the pavement and roadside, with their extent and severity ranges are listed in table-3.1 below.

Table-3.1: List of Commonly Occurring Defects

Defect	Extent	Severity	Remarks
Bituminous surface			
Pothole	Area sq m	Depth 25-50 mm > 50 mm	 Low High
Cracking	Area sq m	Crack width < 3 mm > 3 mm	 Low High
Depression	Area sq m	Depth 25-50 mm > 50 mm	 Low High
Edge Failure	Area sq m	Depth 25-50 mm > 50 mm	 Low High
Raveling/ Delaminating	Area sq m	Depth <10 mm 10-25 mm	 Low High
Rutting	Linear meter m	Depth 25-50 mm > 50 mm	 Low High
Hard Shoulder			
Low Hard Shoulder	Area sq m	Depth 25-50mm > 50 mm	 Low High

[Note: For the purposes of consistent reporting, with potholes and edge failures the defect is not to be recorded if it is less than 25 mm deep. This is not to say that small defects are not important, nor does it mean they will not be repaired. The reason is that experience has shown that the most variable aspect of road condition surveys between one person to another has been the recording of small potholes. Very small defects were recorded as "potholes" by someone and not recorded at all by others; this had a distorting effect on the uniformity of the surveys. Once potholes were only recorded when they were at least 25 mm deep the recording process became much easier for the teams in the field and the surveys became more uniform and standard as a result. Very small potholes, less than 25mm deep (loss of aggregates from top layer) should be recorded under ravelling]

4 Method of Assessing Road Condition

4.1 General

To be able to serve the requirements of maintenance management, the road condition survey must be based on a standard method with specific definition of road condition. Unless this is done it would be impossible to compare condition of one road against the other, or on one road from one year to the next.

In order to obtain data as objective as possible that are suitable to be processed for further application in assessing maintenance need, budget allocation, estimation of works and ultimately preparation and execution of annual maintenance program, it is mandatory to conduct rapid and detailed road condition surveys based on a reference document, such as pavement damage catalogue. The catalogue included in Section-II of this manual is a photo documentation of frequently occurring pavement damages along with their description in bituminous roads.
The road condition surveys to be carried out include two levels of evaluation requiring a precise identification and quantification of principal defects. In the first step, Rapid Road Condition Survey (RRSC) has to be carried out over the entire maintainable road network, and in the second step, Detailed Road Condition Survey (DRCS) over the selected roads or sections of the roads (identified from RRCS) for preparation of detailed working estimate to implement the annual maintenance program of the district.

4.2 Rapid Road Condition Survey

The Rapid Road Condition Survey (RRCS) has to be conducted on the BC road network (Upazila roads and Union roads) to acquire condition data of each road, Upazila-wise. This survey will indicate general condition of the network and will identify those roads or sections of roads requiring routine and periodic maintenance or rehabilitation/ reconstruction in the near future. It is basically a visual inspection without taking precise measurement of defects by instrument/ equipment. This has to be done with reference to the pavement damage catalogue attached to this manual and from the judgement of the field engineer performing the task.

The survey should be carried out by a team 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 UE will be responsible for coordinating all RCS works within his Upazila and for ensuring that the data are transmitted to the district office for taking into the RSDMS database maintained in Executive Engineer's office after necessary checking and certifying. The Team Leader will be responsible for organising and managing all works within his jurisdiction and for ensuring that the required forms are filled in correctly and the data are entered into the system through RSDMS properly.

4.2.1 Procedure

Two different elements of the road have to be surveyed: (a) the carriageway and (b) the road sides (shoulders and slopes). The appraisal of condition is to be made by recording approximate quantitative values to the parameters prescribed in Annex-1, Form: RCS-1 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.

To perform RRCS, assessment should be made for two categories depending on the degree of seriousness, namely; Low and High under each type of defect described in Form: RCS-1. Defects have to be observed in terms of extent (how large it is) and severity (how serious the damage is) and to be recorded against each type by using eye estimation and engineer's judgement. This primary survey will indicate the general condition of the network and identify the sections, where further inspection would be required to plan and implement appropriate maintenance works.

The survey team should use motorbike/ bi-cycle/ rickshaw-van to conduct RRCS over the entire BC road network of the Upazila. Both right and left shall have to be observed from the line of travelling. The team will stop in every 250m interval, generally, to record their observations on the Form: RCS-1, but they can stop at any intermittent points to record defects if situation demands. At the beginning of work, the team may wish to take measurements with the help of instruments to adjust their eye estimation, in course of doing works their eyes will be adjusted and sense will work efficiently. This is to note that at this stage, precise measurement of defects is not necessary, since these measurements will not be used in preparing working estimate to implement the work. Rather RRCS would be used to

assess maintenance need of Upazila/ District/ Country. This has to be completed by the end of April of each year before proposing the yearly allocation of maintenance fund.

4.3 Detailed Road Condition Survey

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: RCS-2 given in Annex-1 of this document.

Detailed road condition surveys should be conducted during August-September after the monsoon rains and prior to preparation of maintenance scheme to implement annual maintenance program. Data obtained from this survey will be used in preparing working estimate of scheme and that will be submitted to appropriate level for necessary approval.

The Upazila Engineer will supply required number of registers to record the data from detailed road condition survey in the specified format (Form: RCS-2) road by road of the surveyed network. These registers will be preserved by the Upazila Engineer as reference and will be used for the following purposes;

- To prepare detailed estimate of maintenance work following the actual measurement of defects
- To engage MMT for patch repairing at different chainange over the road length (at scattered locations)
- To compare variations if any from the time of RRCS
- To use as reference while handing over the site to the contractor for physical work

4.3.1 Procedure

The detailed road condition survey should be carried out preferably by the same team who performed the rapid road condition survey. The following steps should be carried out:

a. The DRCS has to be performed by walking the entire sections of the network identified from RRCS. One of the members of the team will inspect the right hand side of the carriageway, while the other will inspect the left hand side, one of them will record measurements in the field book

b. Distance from the starting point onwards to be measured by using measuring wheel/ chain/tape and it should be done with reference to the kilometre post, where kilometre post is not available, reference should be made with permanent objects nearby.

c. Data (measurement of damages) has to be recorded in the field book with respect to the prescribed Form: RCS-2 and this should be done for two characteristics: extent (Length X Breadth) and severity (Depth) for each type of damage. All the defects have to be recorded corresponding to their locations, chainage-wise.

d. The Team Leader will be responsible for organising and managing all works within his jurisdiction and for ensuring that forms are filled in correctly and the data are entered into the system properly for subsequent analysis and works.

e. The UE will be responsible for coordinating all works within his Upazila and for ensuring that the data are stored properly after necessary checking and verifications.

5 Rating from Rapid Road Condition Survey

5.1 Rating Pavement Condition

Rapid Road Condition Survey will provide necessary data for rating various defects and thereby the condition of the pavement. The rating will be applied for six types of commonly occurring surface defects for each segment of 500 m length. Pavement conditions are rated as good, fair, poor and bad on the basis of rating defects by providing point values. These values for each defect are added together to obtain a total score for each segment. Total score for rating the pavement condition is given below:

Road Condition Rating	Total Score
Good	6 - 9
Fair	10 – 15
Poor	16 – 21
Bad	> 21

The road condition data from RRCS has to be entered into the system and the computer will calculate and analyze the data through RSDMS software and produce segment-wise rating of the surveyed road. The system will calculate the percentage of damaged area segment-wise and will compare with the defined range and then provide a point value for each defect. The values of all defects are added together to produce a total score for every segment and that has been calibrated with the pavement condition. The rating calibration is given in table- 5.1 for determining the pavement condition.

Table- 5.1: Rating of Bitumen Surfaced Pavement

Type of Defect	Percentage of Area Damaged			
Potholes	<1%	1% - 5%	5.1% - 15%	>15%
Cracking	<2.5%	2.5% -12.5%	12.51% - 25%	>25%
Depression	<1%	1% - 5%	5.1% - 15%	>15%
Edge Distress	<1%	1% - 5%	5.1% - 15%	>15%
Ravelling/ Delamination	<2.5%	2.5% - 7.5%	7.51% - 15%	>15%
Wheel Track Rutting	<2.5%	2.5% - 5%	5.1% - 15%	>15%
Rating	1	2	3	4
Total Score for Rating	6 - 9	10 – 15	16 - 21	> 21
Classification	Good	Fair	Poor	Bad

6 Structure Condition Survey and Inspection

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 system should ensure that only data, which is specifically required, is collected at the appropriate time, thus ensuring that data is current for the purpose and at the same time avoiding unnecessary work by limited staff resources.

The computer-based Road and Structure Database Management System of LGED contain a huge amount of data concerning the LGED roads and bridges/ culverts. The bridge condition data is not a fixed set of data and must be continuously updated with accurate and reliable condition information from the field in order to ensure that budgeting, planning, and programming can be done in an effective and efficient manner. In order to achieve these objectives the design of bridge database shall have to be developed further to accommodate all necessary records into the system.

Instructions and guidance notes are furnished in the following sections. Bridge/ Culvert Inspection Form SCS-1 and SCS-2 respectively are given in Annex-2. All relevant data are to be entered into RSDMS for subsequent analysis

6.1 Annual Structure Condition Survey

Routine checking of all bridges/ culverts is carried out during the annual structure condition survey, so that obvious deficiencies such as damaged elements, faulty drainage, scouring etc. are noted and reported. This is the first step assessment of the external characteristic of the structure and is undertaken by the Sub-Assistant Engineer of respective Upazilas. Annual structure condition surveys are conducted 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 SCS-1 and to be used in maintenance planning and further detailed inspection of damaged elements.

After completing survey of all the structures within the Upazila and entering the data into the computerised system, the RSDMS software will generate a summary report of all the SCS-1 data structure-wise. The purpose of this report is to allow the Upazila Engineer and Executive Engineer to see the condition of the bridges and culverts surveyed under their respective jurisdiction at a glance and use these data in structure maintenance planning, and make remarks on a particular structure if it is felt so.

The second level is SCS-2; a more detailed survey of the structural elements of the bridges requiring precise engineering judgement. The bridge length up to 30m should be undertaken by the Sub-Assistant Engineer, while the length is more than 30m it should be done by the Upazila Engineer. Closer inspection of deck soffit, underside of bridge deck and girders, bearing shelves, seats, etc. is required at this level of inspection. Data from SCS-2 survey would be used to estimate the maintenance/ rehabilitation need and to prepare the annual maintenance program of bridges/ culverts with prioritizations.

Beside, well experienced and qualified bridge engineers should undertake the full structural inspection of selected bridges (larger bridges over 50m span) rated as major elemental/ structural damage. The engineer should have enough experiences in advance inspection techniques. The purpose of this inspection is to determine whether the bridge is to be 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.

6.2 Frequency of Surveys and Inspections

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 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.

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 SCS-1 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 SCS-2 for “A” category (no damage) bridges at an interval of 2 years, “B” category (minor damage) bridges at an interval of every year, and “C” & “D” category (major elemental/ structural damage) bridges as per necessity (being reported by SAE). 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. The frequencies of survey/ inspection are shown in table-6.1 below;

Table-6.1: Structure Survey and Inspection (in years)

Condition	Description	Survey Type		
		SCS-1	SCS-2	ACS
Staff category		SAE	UE	BET (LGED HQ)
A	No Damage	Yearly	2 Years Interval	-
B	Minor Damage	Yearly	Yearly	-
C	Major Elemental Damage	Yearly	Yearly/ half Yearly	As per necessity
D	Major Structural Damage	Yearly	As and when reqd.	As per necessity

Notes: SCS-1 Structure Condition Survey- 1
SCS-2 Structure Condition Survey- 2
ACS Advanced Condition Survey
BET Bridge Expert Team from LGED HQ

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 are taken at right time. The Upazila Engineer will provide necessary cooperation at various stages of the work.

6.3 Bridge/ Culvert Components

To carry out structure condition survey, different elements of the structure have to be inspected thoroughly. Specific structure components are identified and inspected in relation to structural condition and functionality. Bridge components and sub-components which must be inspected in order to check deterioration/ distress are itemized as follows:

Bridge Super Structure Components

1. Deck Components
   a) Deck slab
   b) Kerbs/walkways
   c) Bridge railing
   d) Expansion joints
   e) Drainage Device

2. Beams/ Girders (Longitudinal)

3. Diaphragms of cross frames, cross-girders

4. Truss Components
   a) Floor beams
   b) End posts
   c) Joints fixed with rivets or bolts
   d) bracing

5. Bearing devices

6. Arch components

7. Connection
   a. Welds
   b. Rivets
   c. Bolts
   d. Hinges/Articulations

Bridge Substructure Components

1. Abutments
   a) General conditions
   b) Beam seats and shaft/wall/columns
   c) Back wall
   d) Wing walls
   e) Footing/ piles etc.
   f) Settlement
   g) Scour
2. Piers
   a) General conditions
   b) Beam seats and shaft/ wall/ columns
   c) Footing/ piles etc.
   d) Scour
   e) Settlement

Culverts

a) General conditions
b) Alignment
c) Adequacy
d) Debris accumulation
e) Headwall or wing wall condition
f) Condition at inlet and outlet

Channel Conditions (if applicable)

a) Alignment
b) Protection (vegetation, rip rap, etc.)
c) Waterway adequacy
d) Scour

Approaches to Bridge or Culvert

a) Alignment
b) Grade
c) Approach slabs
d) Guard rail
e) Embankment condition
g) Relief joints

In addition to the serviceability and functionability of bridge components, each component must be analyzed for structural deficiencies and or deterioration, Concrete structural components warrant inspection for various cracking patterns (longitudinal, diagonal, mesh pattern, etc.) deck spilling, joint spilling, and other signs of distress or deterioration.
Steel structural components warrant inspection for rust and loss of section due to cursive action, stress cracks, bluckes, kinks, collision damage, and other indications of strength reduction and distress. Masonry components warrant inspection for damage due to weathering, spilling, plant growth (in joints and cracks), and abrasion due to wind-blown particles, seasonal expansion/ contraction and strength reducing factors.

6.4 Criteria for Assessing the Degree of deterioration

All observations of deterioration must be recorded as either major or minor in extent. It is very important to ensure that assessments of extent are uniformly recorded. The general criteria for major deterioration are as follows:

Observation	Major Deterioration
Scouring	Underside of pile cap is exposed. Visible depth of scour exceeds 1m Volume of scour exceeds 15 m3
Leaning/ Tilting	There is evidence of backfill material having being washed out. Horizontal displacement at top measured with string line exceeds 1 in 30 or maximum 150mm
Settlement	Bridge approaches are average 100 mm lower than the deck at a distance of 1 m Vertical displacement of superstructure is clearly visible by eye. Vertical differential displacement of structure measured on a horizontal string line exceeds 1in 60,or 50mm over a length of 3m
Obstruction	Obstruction cannot be removed by hand by local labour, and has to be carried out by contract or requires other special attention.
Cracks	Cracks in concrete are clearly visible from a distance of 3 m Maximum crack width in concrete exceeds 1 mm Cracks in concrete occur in critical areas, e.g. under bearing, at beam mid span. Any cracks in steel work.
Concrete Spilling	Soffit reinforcement is fully exposed over a single area exceeding 1 m2 of deck or half width of beams.
Damaged or missing sections	All structural members in concrete or steel. All holes in concrete deck. All railing members.
Missing Bolts	Structural joints.

Any observation which does not meet the above criteria and conditions should be recorded as minor.

6.5 Guidelines for Assessing whether to Repair or Replace

Element	Unit	Indicators	
		Repair	Replace/New
Approaches	m^2	Approach ramp does not run smoothly on to the deck, causing shock/impact load on to the deck member. (Observe three heavy trucks/buses passing the joint, and assess the severity of the impact)	
Guide Posits	no.		Deck is narrower then embankment crest width. Minimum 4 No concrete posts required at each corner.
Slope Protection	m^2	Any serious erosion of the embankment should be given suitable protection.	
Toe Wall	m	Cracking Spilling Honeycombing Open joints/ Missing bricks	Severe scour/ erosion of the embankment
Railing	m	Minor cracking Localized spilling Honeycombing	Post and/or rail is seriously damaged or missing
Sidewalk	m	Minor cracking Localized spilling Honeycombing	Damaged or missing sections
Deck	m^2	Minor cracking Minor spilling-less than 1 m wide Honeycombing	Missing sections Major spilling-exceeds 1 m wide Extensive open cracking
Concrete	m	Minor cracking	Loss of section due to spilling-reinforcement exposed
Beam		Localized spilling	
Steel Beam	m		Significant cracking Cross-section reduced by more than 20% due to corrosion
Truss Bailey	m	Minor rusting or corrosion	Damaged or missing sections/members Cross-section reduced by more than 20% due to corrosion
Abutment	m^2	Cracking	Leaning in excess of 1 in 30
Pier	No.	Spilling Foundation	Differential settlement and rotation
Wing Wall		Honeycombing Open joints/ Missing bricks	Leaning in excess of 1 in 30
Pier Cap	m^2	Cracking Spilling Honeycombing	

Element	Unit	Indicators	
		Repair	Replace/New
Bearing Seat	no.	Cracking or Spilling at bearing	
Bearing	no		Bearing is missing, has failed or is damaged
Expansion joint	m	Edge Spilling Steel angles damaged, or loose	Missing components
Pile Cap	m^2	Damaged sections Honeycombing	
Foundation Protection	m^2	Scour at pile cap or foundation	

Annex-1
Form: RCS-1

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

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

Annex-1
Form: RCS-2

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)	

Instructions for Completing the Form SCS-1

A separate form BCS-1 is to be completed for each bridge/ culvert structure along the length of the road being inspected.

Form SCS-1 records the following details of the structure:

- Section 1 Location
- Section 2 Structure Type
- Section 3 Superstructure Details
- Section 4 Substructure Details
- Section 5 Foundation Type
- Section 6 Abutment Protection and Approach Drainage
- Section 7 Observation (Condition)

There are three types of entry required for Form SCS-1 and it is essential that all answer boxes be clearly filled in on site at the time of inspection.

Section 1

Road location details are the same as those on the corresponding Road Condition Survey report. Structure ID may already be known to the inspector or otherwise obtained from database (RSDMS). The chainage of the structure should include the kilometre number and be measured at the start of the structure to an accuracy of one meter, e.g. 8+328.

Section 2 to 6

- Where specific dimensions or numerical information is required, the box is clearly marked with the word 'specify'. Dimensions should be in meter to an accuracy of one centimetre (i.e. two decimal place), e.g. 6.44
- The remainder of the information required is either 'yes' or 'no', where the inspector must insert the appropriate symbol (Tick or Cross mark)
- The actual year of construction may be obtained from marking on the bridge/ culvert or from office record. If no information is available the inspector should estimate the year. The inspector must then 'Tick' the box marked 'E' for estimated year or 'A' for actual date and 'cross' the box which is not applicable.
- If there is a load restriction on the bridge/ culvert then the figure should be recorded in the appropriate box. If no restriction is found the box should be marked 'cross'

Section 7

The condition observations section of the form should be completed for one element at a time working from top to bottom. During inspection of each element the inspector must provide his observation corresponding to the degree of damage observed by putting 'Tick' mark on appropriate box (minor/ major). If no problem exists for the observation then the specific box should be crossed through.

Special Notes

- Where the boxes are not applicable they have been blocked out to indicate that no entry is required. All unblocked boxes must be filled in to avoid any confusion.
- Any important additional notes and/ or sketches should be provided in the back of SCS-1.

After completing the SCS-1 form at site, it must be signed and dated by the inspector and his designation should be clearly mentioned

Annex-2

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**		**Element**								
	(? x)		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

Instructions for Completing the Form SCS-2

A separate form SCS-2 is to be completed for each damage structure according to specific instructions. The purpose of using this form is to provide sufficient information to make a preliminary estimate of cost of maintenance/ rehabilitation of the bridge in question. This information will be collected for all damaged components and will be used for budgetary purpose in preparing annual maintenance program.

Form SCS-2 records the following details of the structure:

- Section 1 Location
- Section 2 Preliminary assessment of the overall scope of works necessary to bring the structure back to a state of serviceability
- Section 3 Summary of the overall bridge condition survey and acceptance of the assessment by the Executive Engineer

Section 1

Road location details must be precisely be the same as those on the corresponding SCS-1, a copy of which should be attached with this form (SCS-2) and preserved in file at Upazila Engineer's office.

Section 2

This information will enable to assess the cost associated with each damage structure. Estimated quantities are to be recorded in the repair or replacement column for each element and these may be derived from actual measurement or other method of approximation. If the element is in satisfactory condition then the box must be marked with a 'Tick'. Where boxes are not applicable they have been blocked out. All unblocked boxes must be filled in to avoid confusion. The remark column should be used to report specific observations if any.

Section 3

The purpose of section 3 is for the Upazila Engineer to indicate by his signature the overall condition of the structure. The Executive Engineer must either accept the recommendation of the Upazila Engineer or propose an alternative condition by signature in a different category.

Annex-2

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

Traffic Count Survey

1. INTRODUCTION

1.1 THIS GUIDE

This guide is designed for use by all Local Government Engineering Department (LGED) staff involved in conducting manual classified traffic counts (MCC's) in Bangladesh. The guide sets out the standard procedures for conducting an MCC as well as standard forms for recording the data. These procedures have to be rigorously followed in all counts.

1.2 WHAT IS A MANUAL CLASSIFIED TRAFFIC COUNT?

A manual classified count (MCC) involves counting all the vehicles passing a selected location on a road for a pre-determined period of time. The count can be for any duration, but is usually conducted for twelve hours in a day, and for two days as one is hat day and another is non-hat day in the same week.

The count is conducted by persons standing at the roadside and recording passing vehicles on a form, hence the term "*manual traffic count*". This distinguishes it from counts by machines that can record passing vehicles automatically, which are known as "automatic traffic counts".

The count records individual vehicles by categories (i.e. a truck or car) and the direction they are traveling in. This is the reason it is called a *'classified count'.*

1.3 WHY COUNT TRAFFIC?

Accurate information on the amount of traffic on the rural roads of Bangladesh is vital for the planning of both road maintenance and improvement policies.

As the government has a limited amount of money to spend on the road network it is vital that this is spent in the best possible way, i.e. in a planned way.

To do this, the Local Government Engineering Department directs investment to those roads with the worst traffic problems. They cannot do this without information on traffic volumes, which you are required to provide.

If you get this data wrong, then the LGED will invest in the wrong roads and waste valuable resources, which means wasting taxpayers money.

1.4 REQUIREMENTS FOR TRAFFIC COUNTS

1.4.1 The National Traffic Census

Most MCC's will take place in November-March as part of the Local Government Engineering Department's annual nation-wide traffic census. All Upazila and Union roads are counted every tow years.

The location of the counting stations (traffic census stations) is set out in the LGED Traffic Stations Gazette. All counts on a road must be conducted at the same station. The information collected in these surveys will be used to determine priorities for the annual maintenance budget and it is vital that the data is accurate and collected on time.

1.4.2 Project Traffic Counts

MCC's will also be required on a periodic basis for proposed development projects, such as the construction of a new road or bridge. Generally, you will be advised where to conduct these counts. If, however, the description of where and when to conduct the count is not clear please follow the guidelines in Section 2.

2. GUIDELINES FOR LOCATION OF CENSUS STATIONS AND TIMING OF COUNTS

2.1 LOCATION OF TRAFFIC CENSUS STATIONS

Wherever possible counts should be conducted at the National Census stations set out in the LGED Traffic Stations Gazette. However, if that is not possible or an alternative location is required the location of the census station should be chosen with some care. In general, the traffic counted should be representative of the average traffic flow on a particular section of road. The count should, therefore, not be conducted at locations where traffic is abnormally high on a section of road, i.e. in a village or near to a factory. The following criteria set out some useful guidelines for site selection.

(i) Using judgment and local knowledge choose a location where the traffic flow is typical of the average flow on the road under question.

(ii) Avoid the following locations:
- Built up areas (as a general rule stations should not be located closer than 1km to major towns)
- Market places
- Road junctions
- Bus stops/lorry stops

(iii) The station should be so located that enumerators can take shelter in case of inclement weather and still observe the traffic. A lighted location would be of advantage for counts conducted after daylight.

(iv) Enumerators should have good vision of traffic approaching from both directions. Avoid locating the station on bends or at places where trees/buildings obscure vision.

2.2 TIMING OF COUNTS

The standard MCC will be conducted for 12 hours from 08:00 to 20:00 and for two days i.e. one is hat day and another is non-hat day in same week. Counts should be conducted on days for which the traffic flow is typical of an average day of the week. The Monsoon season should be avoided.

Generally the best months for counting will be from November to March. Within these months the following days should be avoided:

(i) Public holidays
(ii) Hartal days
(iii) Any days when you know from local knowledge that traffic flows will be unusual, i.e. local religious ceremonies, high harvest traffic and high construction traffic.

3. ORGANISATION

3.1 STAFF REQUIREMENTS

The number of persons required to conduct the count will be dependent on the volume of the traffic flow. A minimum of two enumerators will be required at all times, one to count vehicles in each direction of traffic flow. A supervisor will also be required at all times. The supervisor will be responsible for ensuring that the enumerator are filling the forms in correctly, collating the completed forms and acting as a relief for the counters to provide breaks during the shift.

In general, one traffic counting team will work for an 8 hour shift. The following table gives an indication of the number of staff required according to the volume of traffic flow for 12, 16 and 24 hour counts, assuming the standard 8 hour shift for each counting team.

Consideration will have to be given for transport to site and possible overnight accommodation if the site is distant from the base.

Table 1 Staff Requirements for Standard 16 and 24 hour counts

	12 hour count (1 shift)			16 hour count (2 shift)			24 hour count (3 shift)		
Traffic Volume (vehicles per day)	Enumerators	Supervisor	Total Staff	Enumerators	Supervisor	Total Staff	Enumerators	Supervisor	Total Staff
0-10,000	2	1	3	4	2	6	6	3	9
10,000+	4	1	5	8	2	10	12	3	15

3.2 TIMING

Unless otherwise instructed the standard MCC will be conducted for 16 hours form 06:00 to 22:00 and for three consecutive days (excluding Friday). The first shift will count from 06:00-14:00 and the second from 14:00-22:00. If a 24 hour count is required a third shift will count from 22:00-06:00.
But MCC will be conducted in LGED's road for 12 hours from 08:00 to 20:00 in single shift for two days in which one should be hat day.

3.3 EQUIPMENT REQUIREMENTS

The supervisor will require a watch. It would be preferable if the enumerators also had watches as well but this is not vital. Clipboards, with a weatherproof covering will also be required for each of the team members on a shift together with pencils, erasers and sharpeners.

The equipment requirements for a standard team of two enumerators and one supervisor would be:

- *1 nos. Watch (preferably with alarm)*
- 3 nos. Clipboards with waterproof covering
- 6 nos. Pencils
- 2 nos. Pencil sharpeners, erasers
- 1 nos. Paper File (to store forms in)
- 8 nos. Traffic count tally sheets (4 plus spares)-depends upon traffic volume.
- 2 nos. Daily summary sheets (1 plus spare)
- 3 nos. Vehicle Identification Sheets
- 1 nos. Supervisors Check List

4. CONDUCTING THE COUNT

4.1 GENERAL

Vehicles are recorded onto a standard form, the Traffic Count Tally Sheet, (Form: MCC-01), a copy of which is attached in page 5 of this document.

Data is recorded in two hourly time segments in order that variations in traffic flow over the day can be identified. Data is also recorded in both directions of travel. Traffic is classified into the fifteen standard categories, which are described in Section 5.

4.2 PRIOR TO STARTING

The first shift will assemble at the station half an hour before the count is due to start. The supervisor will issue a Traffic Count Tally Sheet (form: MCC-01), which can generate from RSDMS-V software attached to a clipboard to each enumerator, together with a pencil. The enumerators will then fill in details of the count on the top of the sheet, according to the supervisor's instructions, as follows:

- Survey Conducted on Hat Day/Non-Hat Day (Put Tick)
- District Name: Name of District
- Upazila Name: Name of Upazila
- Road Code: LGED Code (i.e. 326052001)
- Road Type: Upazila Road
- Name of road: Road name (i.e. Kaliganj Upazila HQ – Gopalpur GC Road)
- Total Length: 10.5 km
- Date: Date of count (DD/MM/YY)
- Counting Station: LGED station name (i.e. Madan 1km away from Kaliganj)
- Counter Designation: Name of counter
- Supervisor : Name of supervisor

An example of a completed form is shown on the following page.

4.3 COUNTING

The supervisor will direct the enumerators to their assigned sides of the road five minutes prior to the start. At the start the supervisor will announce the start of the count and the counters will begin to record **all** vehicles passing on their side of the road. A five bar tally should be used (see example sheet).

Local Government Engineering Department
Daily Traffic Count (12 Hours from 08:00 to 20:00)

District: Gazipur	Survey Conducted on Hat Day/Non-Hat Day (Put Tick)	Upazila: Kaliganj

Road Code	Road Type	Road Name	Total Length (km)	Counting Station:		Survey Date:	
326052001	Upazila Road	Kaliganj HQ – Gopalpur GC Road	10.5	Surveyed By:		Designation:	

Traffic Type	Time 8am – 10am	Time 10am – 12noon	Time 12noon – 2pm	Time 2pm – 4pm	Time 4pm – 6pm	Time 6pm – 8pm	Total
Motorized Vehicle							
Truck Medium (Two or Three Axle Rigid (>3.5 ton payload))		9		8		7	24
Truck Light (Two Axle Rigid (<3.5 ton payload))	2		9		4		13
Bus Heavy (>40 Seats and >36 Feet Chassis)	9						9
Bus Mini (16-39 Seats and <36 Feet Chassis)	2						2
Bus Light (<16 Seats)	9						9
Utility (Landrover/Jeep type Vehicle)	9						9
Delivery Vehicle (Panel Van, Pickup Truck)	8						8
Car (All Saloon Cars and Taxis)	7						7
Auto Rickshaw (All Three Wheeled Motorised Vehicles)	7						7
Tempo (All Three Wheeled Motorised Vehicles)	9						9
Motorcycle (All Two Wheeled Motorised Vehicles)	5						5
Non-Motorized Vehicle							
Bicycle (All Two Wheeled Non-Motorised Vehicles)	13						13
Rickshaw (Three Wheeled Passenger Non-Motorised Vehicles)	12						12
Rickshaw Van (Three Wheeled Cargo Non-Motorised Vehicles)	5						5
Animal Cart (All Animal Carts and Human Drawn/Push Carts)	2						2

4.4 HIGH TRAFFIC VOLUMES

If traffic volumes are above 10,000 vehicles per day two enumerators will be used for each direction. One will record trucks and buses and the other light vehicles.

4.5 SUPERVISION

The supervisor will ensure that the enumerators are filling in the tally sheets correctly. He will also act as a relief to the enumerators allowing them to have alternate meal breaks.

In addition to these duties the supervisor will be responsible for completing a short report on the shifts count. This will be done on form: MCC-03 Traffic Count Report. This should include a brief summary of the weather conditions, and incidents that may have affected the validity of the count (especially accidents or road closures in the vicinity of the count station). Holidays and Hat days should be recorded in the next space. The final space if for any additional comments, these may relate to absent enumerators or time periods missed for various reasons.

A checklist is attached to following page this section to help the supervisor ensure all the activities are achieved. A copy of this should be kept by each supervisor and the items ticked off during the survey.

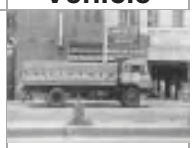
Table-3: Supervisors Check List

Time of Check	Item to be Checked	Checked
Day before count	• Daily Traffic Count Tally Sheets • Vehicle Identification Sheets • Clipboards • Pencils/erasers/sharpeners • Watch	
Start	• Announce Start	
During Count	• Categories correctly recorded • Announce change of hour every two hour • Enumerators using correct row/column on form • Tally sheet replaced when required	
After finish	• Complete Daily Traffic Summary Sheet • Return Completed forms to concern authority.	

5. VEHICLE CLASSIFICATIONS

Vehicles have to be recorded according to the following fifteen categories. To help with identification a *Vehicle Identification Sheet,* showing pictures of typical vehicles in each category, is attached on the following page. Each enumerator should be provided with a copy of this when counting. The following list gives a brief description of the vehicles to be included in each category.

Table-4: Vehicle Identification Sheet

Category	Type	Description	Typical Vehicle
1.	Truck Medium	Two or Three Axle Rigid (>3.5 ton payload)	
2.	Truck Light	Two Axle Rigid (<3.5 ton payload)	
3.	Bus Heavy	More than 40 Seats on 36 Feet or longer Chassis	
4.	Bus Mini	16-39 Seats and <36 Feet Chassis	
5.	Bus Light	<16 Seats	
6.	Utility	Landrover/Jeep type Vehicle	
7.	Delivery Vehicle	Panel Van, Pickup Truck	
8.	Car	All Saloon Cars and Taxis	

Category	Type	Description	Typical Vehicle
9.	Auto Rickshaw	All Three Wheeled Motorised Vehicles	
10.	Tempo	All Three Wheeled Motorised Vehicles	
11.	Motorcycle	All Two Wheeled Motorised Vehicles	
12.	Bicycle	All Two Wheeled Non-Motorised Vehicles	
13.	Rickshaw	Three Wheeled Passenger Non-Motorised Vehicles	
14.	Rickshaw Van	Three Wheeled Cargo Non-Motorised Vehicles	
15.	Animal Cart	All Animal Carts and Human Drawn/Push Carts	

Benkelman Beam Test

1. INTRODUCTION

A road network is a valuable Government asset and failure to maintain the roads that form the network will lead to their rapid deterioration which in turn will lead to increases in road user costs and accidents and the need for expensive re-construction works. Well-maintained roads make a valuable contribution towards the country's economy.

Maintenance of road is dependent on several factors, one of which is the bearing capacity of the pavement. To determine what treatment is necessary the bearing capacity of the pavement should to be known.

Bearing capacity of roads in terms of deflection has the greatest influence in the HDM analysis. So correct measurement of bearing capacity is a prerequisite for doing the correct HDM analysis.

Accurate information about pavement strength is a critically important input for use in Road Maintenance Management System (RMMS).

Different types of tests such as the Benkelman Beam Test, Falling Weight Deflectometer and Dynamic Cone Penetrometer (DCP) test and the CBR test all provide useful information on pavement strength. It is obviously essential to select the right type of test. For strengthening of existing pavements, the Benkelman Beam test or the Falling Weight Deflectometer is preferred, since it gives the actual strength of the pavement directly and quickly.

The purpose of deflection testing is therefore to determine pavement strengths in order to decide what rehabilitation works need to be undertaken and how strong they need to be.

The surveys are to be carried out from the survey routes Start Node and to the survey routes End Node, e.g. always in positive direction.

The importance of having accurate deflection data for input into the RMMS cannot be overemphasized. The aim of this section is to set out, as clearly as possible, a simple description of what Benkelman Beam testing is and how it should be undertaken. The importance of accuracy of observation and attention to detail when filling out the various forms is stressed throughout.

2 TIMING OF DEFLECTION MEASUREMENT

Deflection measurement is done annually preferably from October to February.

3 EQUIPMENT NEEDED

Following equipment are needed for the Benkelman Beam measurement:

- Vehicles (Pickup or Jeep)
- Benkelman Beam (one or two)
- Distance Measurement Equipment (Odometer/Tripmeter)
- Truck (with a rear axle load of 8,16 tonne)

Other materials and stationers required are:

- Paint, chalk and brush
- Survey forms
- Wooden pencils
- Jute ropes

4 BENKELMAN BEAM TEST PROCEDURE

There are two basic methods which are commonly used for operating the deflection beam. i) Transient Deflection Test and ii) Rebound Deflection Test.

4.1 The Transient Deflection Test

This type of test has been adopted for measuring deflections in the U.K and is the method used by the overseas nit of TRRL in the developing countries. The test is carried out in the following steps:

i) Test points are marked on the near side and off-side wheel paths of the near side lane of the road using road marking crayon: in a lane of normal width. These would be approximately 0.9m and 2.7m from the verge. The distance between test points depends mainly on the purpose of the survey and the visual condition of the road surface.

ii) The lorry is positioned parallel to the road edge with its rear axle 1.3m behind the test point such that when it moves forward the test points bisect the distance between the tyres of the dual wheels. By looking through the gap between the dual near wheels the operator can ensure that the beam is lying in the gap, parallel with the direction of the lorry's forward movement, and that the up is approximately in the with the center of the front tyre when the front wheels of the lorry are pointing straight ahead. The adjustable pointer is then aligned to the position of the beam. The pointer in this position can then be used by the operating team to locate the beam in subsequent testing without reference to the front tyres.

iii) With the lorry in the initial stationary position a deflection beam is positioned centrally between the dual rear wheels with its probe point resting on the test point. By using the adjustable les and the support level the frame of the beam is leveled transversely and having cheeked the alignment of the beam and adjusted if it necessary, the locking device on the beam is released. Adjustment of the rear foot will ensure that there is adequate travel of the dial gauge spindle to record the deflection.

iv) The vibrator is switched on and the dial gauge scale is rotated until a reading of zero is indicated. When the beam operator gives the signal the lorry is driven forward at creep speed to a position at least 5m beyond the test point. The speed, which should be checked once or twice a day is that required to cover a distance of 5m in 10 secs $\pm$1sec. (approx. 2km/h). Vibration of the beam is continued until the lorry has reached its stopping position.

Sometimes during the period between setting the dial gauge to zero and the lorry actually starting to move, the dial gauge reading may change slightly. It is recommended that this new reading is recorded as the initial reading rather than resetting the dial gauge to zero.

v) Records are kept of the initial, maximum and final dial gauge readings. The value of deflection is calculated by adding the difference between the maximum and initial readings to the difference between the maximum and final readings, Where the lengths of the arms of the pivoted beam are in the ratio of 2:1 the differences between the dial gauge readings must be doubled to obtain the actual deflection and recovery of the road surface.

The transient deflection is the mean of the loading and recovery deflections in the transient test.
Deflection=[2 x max.- (initial+final)] x 0.02mm

Two measurements are normally made at each test point and the mean result obtained. For deflections greater that 25x0.02mm the readings should not differ by more than 5% of the mean value, for smaller deflections the difference should not exceed 10%. If the readings differ by more than the limits then additional tests should be carried out until acceptable repeatability is obtained.

vi) At the beginning of the transient deflection test the loading wheels are 1.3m from the toe of the beam and 1.44m from the twin feet of the beam. Occasionally when the lorry is in this position the toe and the from feet of the beam are within the deflected bowl of the road surface under the loaded wheels, In rare instances small displacements of the rear foot of the deflection beam have also been detected. On roads with crushed stone of weak soil-cement road bases overlying sub-grade with CBR values in excess of 8 percent. The rear in the dial gauge reading caused by the influence of the loading wheels, when the lorry is in the initial position can be calculated from the following equation.

$d = \frac{1}{2}D - \frac{7}{5}S + \frac{9}{10}K$ where,

d = error in dial gauge reading
D = depression of the probe point of the beam
S = depression of the front feet of the beam
K = depression of the back foot of the beam

The error in the measured transient deflection will be of the order of 0.9x (the movement of the front feet during the test) or less depending upon the exact shape of the deflected bowl and the measured deflection will, on the roads described above, be larger than the actual deflection.

A second deflection beam can be used to measure the movement of the beam feet during a deflection test, The influence of the front and rear wheels of the lorry on the probe point of the beam can be investigated by varying the position of the lorry and beam
If movements of the feet of deflection beams is found less than 6x0.02mm. It is recommended that corrections for movements of this magnitude are not made, and that the use of non-absolute deflections is accepted. If the residual reading on the dial gauge indicates that the magnitude of the movements of the feet of the beam is larger than this, a correction can be made using a second deflection beam as suggested above.

4.2 The Rebound Deflection Test.

The type of test has been adopted by the Canadian Good Road Association (CGRA) and is also practiced in India. The test is carried out in the following steps:

i) The lorry is driven slowly parallel to the edge and stopped such that the left side rear dual wheel is centrally placed over the test point for deflection measurement.

ii) The probe point of the Benkelman Beam is inserted between the gap of the dual wheel and is placed exactly over the test point.

iii) When the dial gauge reading is stationary or when the rate of change of pavement deflection is less that 0.025mm per minute the initial dial gauge reading DI is noted.

iv) The truck is moved forward slowly through a distance of 6m from the start point and stopped and the final dial gauge reading D2 is recorded as before.

v) The two deflection dial readings D1 and D2 from a set of readings at one test point under consideration. Similarly the truck is moved forward to the next test point. The probe point of the Benkelman Beam inserted and the procedure of noting the set of two deflection observation is repeated. The deflection observations are continued at all the desired test points.

vi) The rebound deflection value D at any test point is given by the following conditions:

D=2(D1-D2)

The multiplying factor 2 has been used in the above formula applicable for the beam where the arms of the pivoted beam are in the ratio of 2:1.

4.3 Factors Affecting Deflection Measurements

When measuring pavement deflections in tropical climates using deflection beams and a standard procedure, it is necessary to take account of a number of factors which can influence the magnitude of the recorded deflection. These are:

i) the effect of temperature on bituminous materials.

ii) the effect of seasonal rainfall on pavement strength.

4.4 Correction for Temperature Variations.

For tropical and sub-tropical condition the TRRL has adopted a standard reference temperature of 35^0c measured at a depth of 40mm, to which deflection measured on temperature- susceptible materials are corrected.

Correction for temperature is not necessary for roads with thin bituminous surfacing such as premix carpet or surface dressing over a non- bituminous

surfacing since these are not usually affected by changes in temperature. But temperature correction will be required for pavements having substantial thickness of bituminous construction (i.e. minimum 40mm). Correction need not be applied even in the case of thick bituminous construction if the road surface has severe cracking or the bituminous layer is extensively stripped.

Studies have shown that the deflection-pavement temperature relationship linear above a temperature of 30^0c.

On deflection values measured at pavement temperature greater than 30^0c correction for temperature variation should be 0.065mm for each degree centigrade change from the standard temperature of 35^0c. The correction will be positive for pavement temperature lower than 35^0c and negative for temperature higher than 35^0c. For instance, if the deflection is measured at a pavement temperature of 38^0c, the correction factor will be 0.195 mm (=3x0.065) which should be subtracted from the measured deflection to obtain the corrected value corresponding to standard pavement temperature of 35^0c.

4.5 Description of Required Equipment:

A. Truck:

The truck shall be a two-axle truck with a dual-tyred rear axle. The space between the tyres must be wide enough that the Benkelman Beam can be placed between the tyres without touching them. It is not necessary for the tyres to be of any standard pattern. The truck must be capable of traveling safely and reliably over the steepest and roughest roads to be encountered during the survey, whilst carrying a load of at least 8.16 tonnes on the rear axle (gross weight). The brakes, hand brake, motor and lights shall be in good condition. A working accurate Tripmeter is also very useful.

B. Tyre Pressure Gauges and Tyre Pump:

A tyre pressure gauge and one spare should be calibrated against a master gauge in the laboratory before each survey. The tyre pressure gauge shall be graduated in 0.2 kg/cm2 (2.5 psi) divisions or smaller.

A tyre pump suitable for inflating the tyres to at least 5.6 kg/cm2 (80 psi) shall be carried.

C. Truck Scales

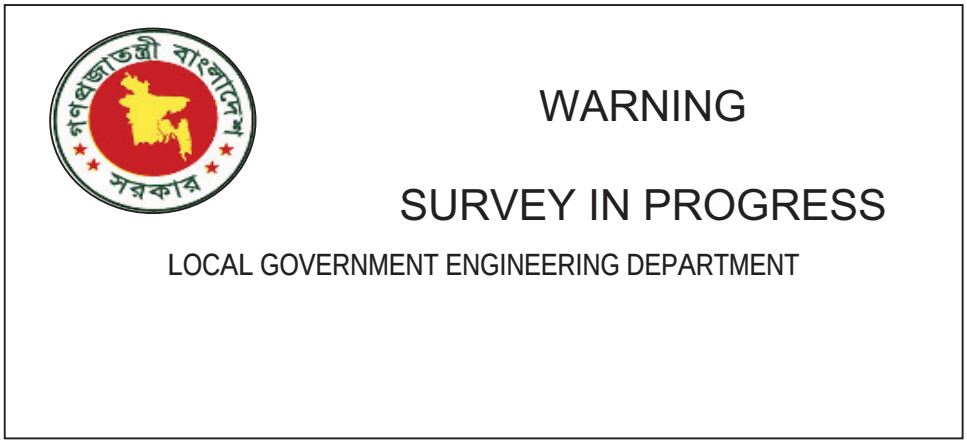
A suitable set of scales for measuring the load on the rear axle of the truck shall be carried on survey. It shall be calibrated using a concrete testing machine or other suitable means immediately before each survey (a suitable portable weigh pad scale is shown in Figure). During the calibration, the test load is plotted against the scale reading. The value of the scale reading for a test load of exactly 4.10 tonnes can then be read off and entered on Form.

D. Safety

To safeguard the test team, especially on heavily trafficked roads, the following safety precautions should be taken:

A cloth or plywood warning sign, as shown in Figure 1,shall be attached to the truck tail-gate.

Figure 1 Warning Sign Details



Two workers with flags, one in front and one behind the truck, for regulation of traffic and protection of the measuring team.

E. Benkelman Beam:

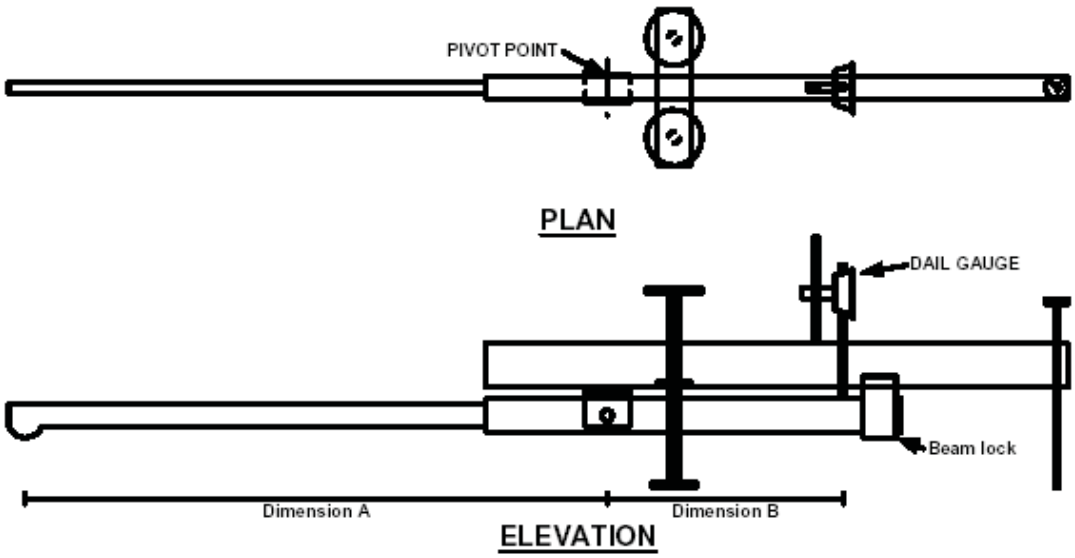
A Benkelman Beam is shown in Figure 2. Dimensions A and B must be recorded on form BB1 for each beam together with the Benkelman Beam No., before use on the survey.

The beam pivot bearing and the dial gauge must move freely without friction or slop. The entire apparatus, must be sturdy, rigid and without slop.

The dial gauge must be graduated in either 0.01mm or 0.02mm divisions. Metric gauges, with reverse (anti clockwise) scales, are preferred.

The beam shall be fitted with a lock to secure the beam during transport. A suitable vibrator mounted near the pivot point is desirable.

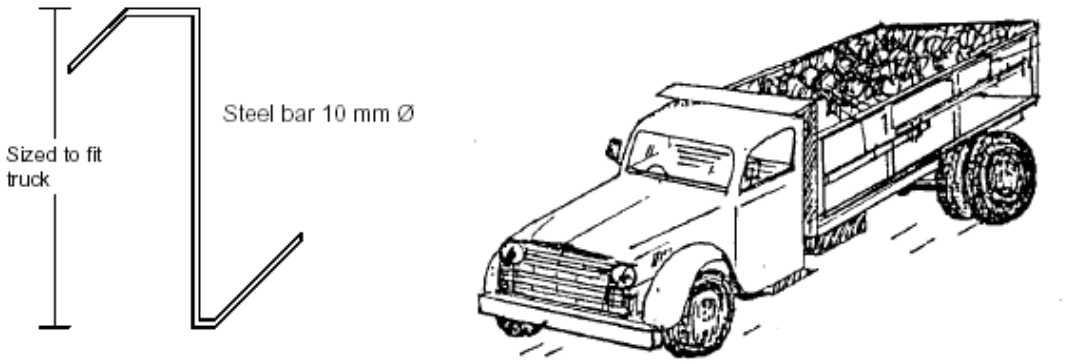
Figure 2 Benkelman Beam



A full set of spanners and tools for preparing and adjusting the Beam shall be carried.

The truck shall be fitted with suitable mounting brackets to carry the beam (between test points only). Figure 3 shows a suitable design of bracket. Before traveling at full road speeds, the Benkelman Beam should be disassembled and properly packed.

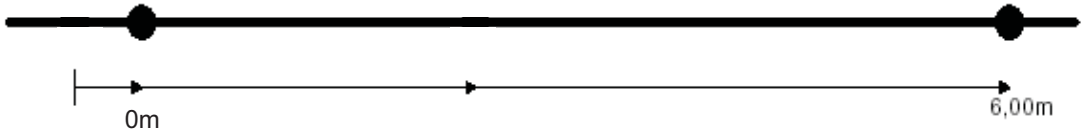
Figure 3 Mounting Brackets for Benkelman Beam



F. Tape Measure and Pavement Marker

1. chalk, paint or some other method of marking the pavement locations.
2. a 50 metre measuring tape.
3. a string line marked at intervals of 0.0metre and 6.00metre, as shown in figure 4, may be used.

Figure 4 String line



G. Field Data Collection Forms

Test forms should be delivered with Ref. Point Code and Offset fields filled out. If the test forms for any reason are delivered without the Ref. Point Code and Offset fields filled out adequate stocks of empty forms for a minimum of one day's testing must be carried.

H. Extra Equipment:

If required, the deflections in the left and right hand wheel tracks may be measured simultaneously, using 2 teams of technicians, 2 beams and 2 sets of the equipment listed in Paragraph 3 above.

Note: Dimension "A" of the two beams should not differ by more than 2 cm.
Broom for Sweeping Pavement

4.6 Loading and Weighing Truck

A. The truck must be loaded so that the rear axle weight is approximately 8.16 tonnes + 0,5 ton. The load must be secure so that it does not shift, and must not absorb water. Concrete blocks, well secured, asphalt or clean river stone hand leveled in the tray are suitable. Sand, bricks, soil and crusher run aggregates are unacceptable.

B Figure 5 illustrates the procedure for weighing using a set of portable weigh pad.

The truck must be parked on a hard surface so that it is as level as possible. The crown of the road pavement on a summit is acceptable. The weigh pad are positioned as shown in Figure 5.

The procedure for computing axle load and correcting deflection readings is given on form.

4.7 Checking Benkelman Beam Dimensions and Dial Gauge:

A. At the beginning of the survey, the dimensions of each Benkelman Beam should be measured to the nearest 1mm, and recorded on Form.

B. The dial gauge should be checked to see if it is calibrated in inches or mm.

C. Some dial gauges fitted to Benkelman Beams have been modified to read double the gauge movement. Check this, by engaging the Beam Lock and placing an object of known thickness (approx 5mm) under the gauge rod.

D. The Dial Gauge Multiplying factor (DGM) is computed, and entered on Form.

E. Finally, check the DGM factor by putting the object of known thickness under the probe tip and check that the dial gauge reading multiplied by DGM factor does give the object thickness.

4.8. Procedure for Deflection Measurement:

A. Each day after the truck arrives at the survey site:

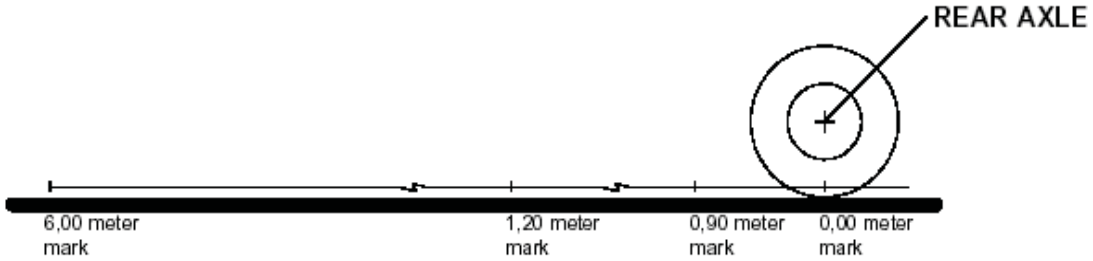
1. **Check axle load**. Adjust if not in range 8,16 + 0,5 tonnes, then record;
2. **Adjust tyre pressure to 80 psi** (5,6 kg/cm2).

B. The truck shall be driven in the traffic lane at about the same distance from the lane edge as the general truck traffic and in the same direction as the general traffic. If for any reason the test has to be carried out driving against the general traffic, the test must be taken in the outer wheel path (the wheel path closest to the edge of the pavement).

C. Stop the truck at the test location and record all required data on form. If there is any loose material on the pavement it should be swept clear before finally positioning the truck.

D. Using the measuring tape or marked string-line, mark the pavement at points 0.00metre, and 6.00metre ahead of the rear axle position.

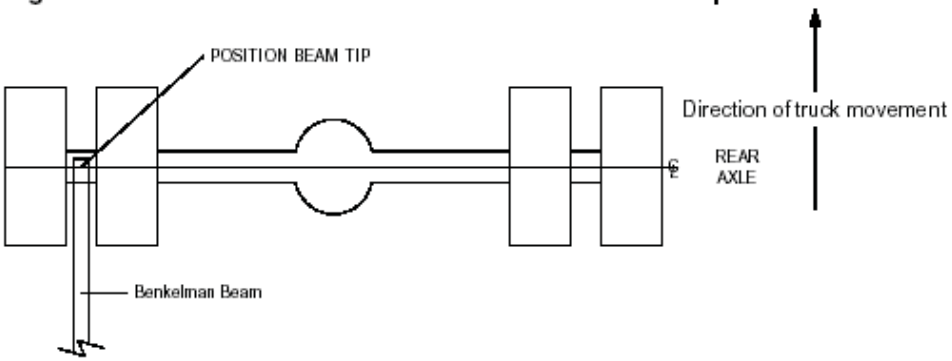
Figure 6 Marking Pavement For Deflection Reading Positions



E. Prepare the Benkelman Beam equipment. Check dial gauge moves freely and smoothly.

F. Place beam in position behind truck with beam tip exactly under axle between the two tyres.

Figure 7 Plan View: Position of Benkelman Beam Tip



G. Secure Beam Lock in unlocked position.

H. Switch on vibrator if fitted, or tap beam lightly between pivot point and dial gauge for example with a pencil. Zero the dial gauge fine scale.

N.B. Coarse scale readings must be taken for all readings, do not rely on counting needle rotations. If the dial gauge has a reverse (anti clockwise) scale, that scale is used.

I. Move truck very slowly forward until the rear axle is just over the 6.00 metre marking. Read and record the dial gauge reading.

J. **For each test point repeat the test two times**, reverse the truck so that the rear axle again is placed over the tip of the Benkelman Beam as shown in Figure 7. Then repeat the measuring procedure from E.

K. Re-lock the beam and lift Benkelman Beam onto the hangers.

N. Continue on to next test point.

Distance to next test point is equal to the offset value indicated on the form, or if next test point is a reference point and the distance to the reference point is slightly more or less than the offset value, then "reset" at the reference point. The distance to the next testing point can be measured in one of the following ways:

1. Tripmeter in the truck, either on the trucks own tripmeter if the scale is in 0.010 km or by an external tripmeter fitted to the truck.
2. measuring tape (50m or 100m) or measuring wheel.
3. A piece of rope (or similar) where the distance between two knots gives the distance e.g. 50m.
4. By another car or motorcycle equipped with a tripmeter with a scale of at least 0.100 km or an external fitted tripmeter.

BENKELMAN BEAM TEST FORM

Date: _____ Road Code: _____ Tyre Pressure:_____kg/cm^2

Recorder: _____ Road Name: _____ Dial Gauge: _____mm

Technician/Operator Name: _____ Rear Axle Load: _____ Tonne Beam Ration (BR): _____

Test Location (Chainage in m)	*Wheel Path Left/Right* (L/R)	Time	Direction Reading		Defection		Temperature		Temperature Correction value	Corrected Deflection (mm)		Remarks
		Start	Initial Reading (D1)	Final Reading (D2)	(D2-D1)	(D2-D1) x BR	Air (^{0}C)	Pavement (^{0}C)		(7)-(10)	Average	
1	2	3	4	5	6	7	8	9	10	11	12	13

Dynamic Cone Penetration Test

1. Introduction

The dynamic cone penetrometer (DCP) is an instrument designed for the rapid in-situ measurement of the structural properties of existing road pavements (especially for unbound materials). Description of DCP apparatus test procedure, reporting and interpretation of results, factors, affecting the CBR result (obtained from DCP), etc. are described in this article from the technical papers of Transport and Road Research Laboratory (TRRL), UK.

2. Scope

2.1 Using DCP test continuous measurements can be made down to a depth of 800mm or more (When an extension rod is fitted). Where pavement layers have different strengths the boundaries can be identified and the thickness of the layers determined (according to TRRL).

2.2 Co-relations have been established by different research workers between measurements with the DCP and California Bearing Raito (CBR) so that results can be interpreted and compared with CBR specifications for pavement design. This test takes only a few minutes and therefore the instrument provides a very efficient method (according to TRRL) of obtaining information which would normally require the digging of test-pits.

3. Apparatus

The model of DCP apparatus of TRRL (Transport and Road research Laboratory, UK) has the following features as shown in Figure 1:

- Weight of the Hammer is 8Kg, having the free-fall of 575mm
- Angle of the cone is 60, having the diameter of 20mm

4. Operation

4.1 After assembly the first is to record the initial reading of the instrument and checking that it is vertical and then entering the initial reading in the appropriate place on the datasheet.

4.2 The DCP needs three operators, one to hold the instrument, one to raise and drop the weight and a technician to record the results. The instrument is held vertical and the weight carefully rose to the handle. Care should be taken to ensure that the weight is touching the handle, but not lifting the instrument, before it is allowed to drop and that the operator lets it fall freely and does not lower it with his hands. It during the test the DCP leaves the vertical, no attempt should be made to correct this, as contact between the bottom rod and the sides of the hole will give rise to erroneous results.

4.3 It is recommended that a reading should be taken at increments of penetration of about 10mm. However it is usually easier to take a scale reading after a set number of blows. It is therefore necessary to change the number of blows

between readings according to the strength of the layer being penetrated. For good quality granular bases, reading every 5 or 10 blows are normally satisfactory, but for weaker sub-base layers and sub-grades, reading every 1 or 2 blows may be appropriate. There is no disadvantage in taking too many reading, However, if reading are taken too infrequently, week spots may be missed and it will be more difficult to identify layer boundaries accurately, hence important information will be lost.

4.4 After completing the test the DCP is removed by gently tapping the weight upwards against the handle. Care should be taken when doing this as if it is done too vigorously, the life of the instrument will be reduced.

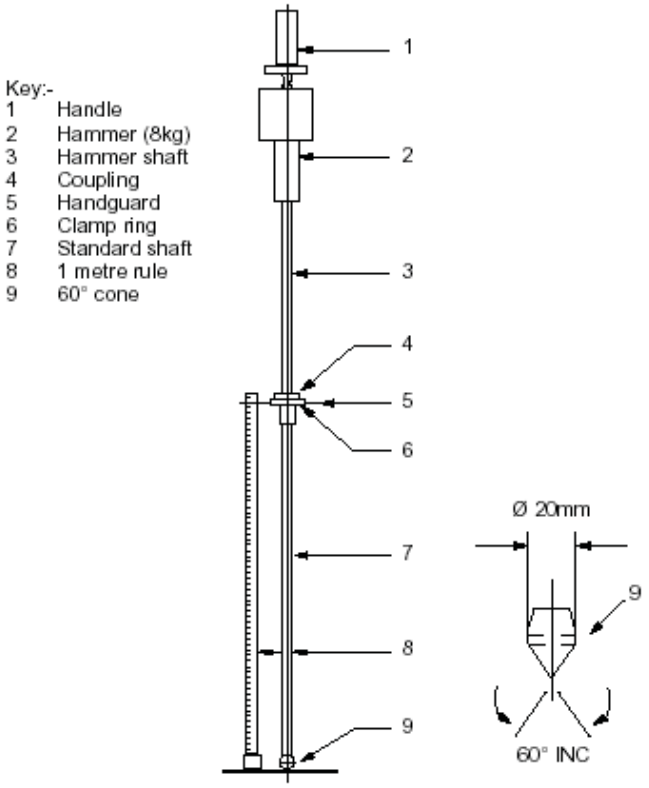


Figure 1 TRL Dynamic Cone Penetrometer

Note: Sometimes it may be required to fix extension rod to perform DCP test at greater depth. In this case, the apparatus must be driven into the pavement to a depth of 400 to 500mm before the extension rod can be added. To do this the meter rule has to be detached from its base plate and the bottom rod spilt to accept the extension rod. After re-assembly a penetration reading should be taken before the test is continued

4.5 Little difficulty is normally experienced with the penetration of most types of granular or lightly stabilized materials. It is more difficult to penetrate strongly

stabilized layers, granular materials with large particles and very dense, high quality crushed stone. The instrument has been designed for strong materials and therefore the operator should persevere with the test. Penetration rates a lows as 0.5mm blow are acceptable but it there is no measurable penetration after 20 consecutive blows it can be assumed that the DCP will not penetrate the material. Under these circumstances a hole can be drilled through the layer using an electric or pneumatic drill or by coring. The lower layers of pavements can than be tested in the normal way. If only occasional difficult are experienced in penetrating granular materials it is worthwhile repeating any failed tests a short distance away from the original test point.

4.6 The DCP can be driven through both single and double surface dressings, but it is recommended that thick bituminous surfacing should be cored prior to testing

4.7 If the DCP is used extensively for hard materials wear on the cone it will be accelerated. The cone is a replaceable part and it is recommended that it should be replaced when its diameter is reduced by 10 per cent. However other causes of wear can also occur hence the cone should be inspected before every test. Typically the cone will need replacing after about 10 holes in hard material and in the absence of any damage other than shoulder wear, this is the recommended practice

5 Interpretation of Results

5.1 The result of the DCP test are usually recorded on a field data sheet and then plotted in a graph. A typical example of DCP datasheet with graph is shown later.

5.2 The boundaries between layers are easily identified by the change in the rate of penetration. The thickness of the layers can usually be obtained to within 10mm expect where it is necessary to core (or drill holes) through strong materials to obtain access to the lower layers. In these circumstances the top few millimeters of the underlying layer is often disturbed slightly and appears weaker than normal.

5.3 Relationships between the DCP readings and CBR have obtained by several research workers, which is shown in Figure 20.2. Agreement is generally good over most of the range but differences are apparent at low values of CBR, especially for fine grained materials. It is expected that for such materials the relationship between DCP and CBR will depend on materials state, therefore if precise values are needed it is advisable to calibrate the DCP for the materials in question.

Note: In LGED laboratory DCP of TRRL (UK) Model is used. Hence Line No-4 of Figure 2 shall be used for CBR determination from DCP test result. Equation of this line is given below from which CBR could be determined also:

$$\textbf{CBR (in\%)} = \log_{10}^{-1} [2.493 - 1.077 \log_{10} (\text{Av. Penetration per Blow in mm})]$$

Special Note

1. The DCP-CBR relationship (Figure 2) is applicable for same materials having same moisture content and density in a test location. CBR value of a material

found from DCP test may not be similar to that when performed on laboratory compacted specimen at same % compaction because the moisture content may not be the same. Especially when the soil is cohesive, DCP test will give higher CBR value. Because it becomes hard when dry. Hence a layer may show different DCP result when tested in a dry condition then tested in a wet condition though its dry-density (%compaction) remains the same. So if Moisture Content, LL/PI, %Compaction are known, then concerned engineers can apply judgment during result interpretation, decision making. Dry layer of cohesive soil may be tested after continuous rainfall. Over consolidated day layer may also give higher CBR value.

Note: At the LGED central laboratory CBR of a over consolidated clay of Tangail was found as 8.1% (using undisturbed CBR specimen tasted after soaking at the laboratory) DCP test was also performed at the same location (from where the undisturbed CBR specimen was brought) at partially wet condition and CBR was found as 13.5%.

2. Engineers may develop correlation of DCP and in-situ CBR (using truck-mounted CBR apparatus) for local material. But both the test should be performed at the same/adjacent location and at the same time (in order to perform the tests at similar moisture condition and similar compaction).

3. Granular and unbound material may exhibits lower CBR value from DCP test when tested in a unconfined or topmost layer. But this may show higher CBR value when another layer is constructed over it or it becomes confined.

4. When DCP test is performed to determine the in-situ CBR of a particular layer (say sub-base,) base), then first the layer thickness should be determined by digging a hole. Then average straight-line (Blow versus Penetration) should be plotted using the data of that layer thickness. Using the average slope(Penetration) per blow) of the line, the average CBR for that particular layer could be determined.

5. Though there are several limitations, still without performing of compaction test, it is possible to do the quality control of a granular sub-base or base course by only checking the Gradation Proportion of Material (specially for SS/ASS layer). Thickness of layer, Los Angeles Abrasion Value of Aggregate and in-situ CBR using DCP Test Because often the Compaction Tests (MDD and Field density) given erroneous results for granular materials, specially when it contains appreciable amount of coarse aggregates. In that case actually Relative Density test is more appropriate. Concerned engineers should clearly specify whether DCP test is sufficient or additional tests are required for a project. This should be remembered always that DCP test is not the alternative of field dry-density determination (sand cone/core-cutter test) and % compaction determination in road or embankment construction. Most specification does not allow DCP test. However this test is very easy to perform and test and much more number of DCP tests are possible in short time. The suitability of a method/test should be decided, by also considering the size and importance of a project and manpower/equipment/time available for testing.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT

Project : _____ Laboratory at : LGED HQ, Dhaka

DYNAMIC CONE PENETROMETER (DCP) TEST

Client: XEN, LGED, Madaripur Memo No./Ref., Date: As per the letter of XEN,Dated 3-2-95
Scheme: Road Embankment Location: Madaripur Sadar Thana
Date of Test: 10 - 02 - 95 Laboratory Register No.: ISP/DCP/117/94-95
Soil Parameter: %Passing #200 Sieve = 33, LL=34, PI=9 Classification: A-2-4 (As per AASHTO M 145)
Type of DCP: Angle of Cone - 60°, Diameter - 20 mm, Hammer - 8 Kg, Drop - 575 mm (TRRL UK Model)
Condition/Wear of the Cone: The Cone is Usable Since the Wear is Less

TEST DATA

Chainage (Length Rep - resented)	Layer	Layer Thickness	Moisture State	Aggregate % and Other Parameter	DCP Test Data: Blow(No)	Reading(mm)	Depth(mm)	CBR Result
3+400 m (3+300 to 3+500 m.)	Sub-grade	Top 0.5m of embankment is assumed as the Sub-grade	The Test Surface was Dry (Roughly Much Below of OMC)	Soil Don't Contains Any Aggregate	0	81 (Initial)	0	CBR of Top Portion or Sub-grade = 13%
					5	144	63	
					10	219	138	
					15	298	217	
					20	370	289	
					25	515	434	CBR of Lower Layer (Embankment Below Sub-grade) = 4.8%
					30	668	587	
					35	828	747	
					40	976	895	

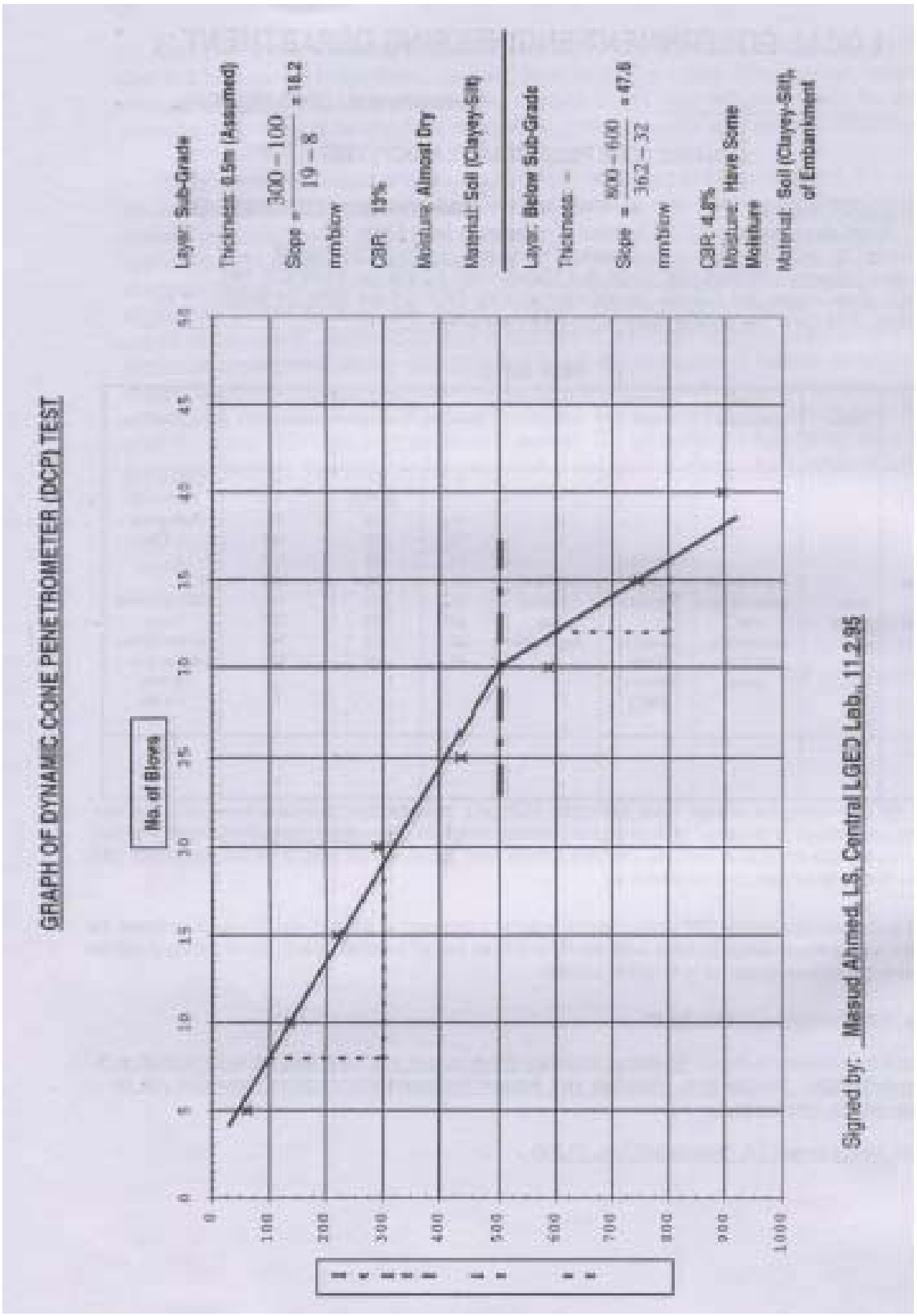
NOTE: For determining the average in-situ CBR (from DCP) of a particular layer (sub-base, base, etc.), that layer thickness should be measured by digging a hole. Average straight-line (Blow versus Penetration) should be plotted using the data of that layer thickness. Using the average slope (penetration per blow) of the line, the average CBR for that particular layer could be determined.

NOTE: It is recommended that the DCP readings should be taken at increment of about 10 mm. This is not necessary that the reading should always be taken at the interval of 5 blows (shown in this datasheet). Before starting of test, the cone should be penetrated up to its largest diameter.

Tested by: Kabir Hossain,Laboratory Helper

Comments of the Laboratory In-charge: Concerned engineers should specify what other tests are required (such as % of Aggregate/Gradation, Moisture State, Thickness, etc.). Because in unsoaked/dry condition; higher CBR may be found (specially for cohesive soil)

Signed by: Masud Ahmed, LS, Central LGED Lab., 11.2.95


GRAPH OF DYNAMIC CONE PENETROMETER (DCP) TEST
No. of Blows
Layer: Sub-Grade
Thickness: 0.5m (Assumed)
Slope = (300 − 100)/(19 − 8) = 18.2
mm/blow
CBR 15%
Moisture: Almost Dry
Material: Soil (Clayey-Silt)
Layer: Below Sub-Grade
Thickness: -
Slope = (600 − 00)/(362 − 32) = 47.6
mm/blow
CBR: 4.8%
Moisture: Have Some Moisture
Material: Soil (Clayey-Silt), of Embankment
Signed by: Masud Ahmed, LS, Central LGED Lab., 11.2.95

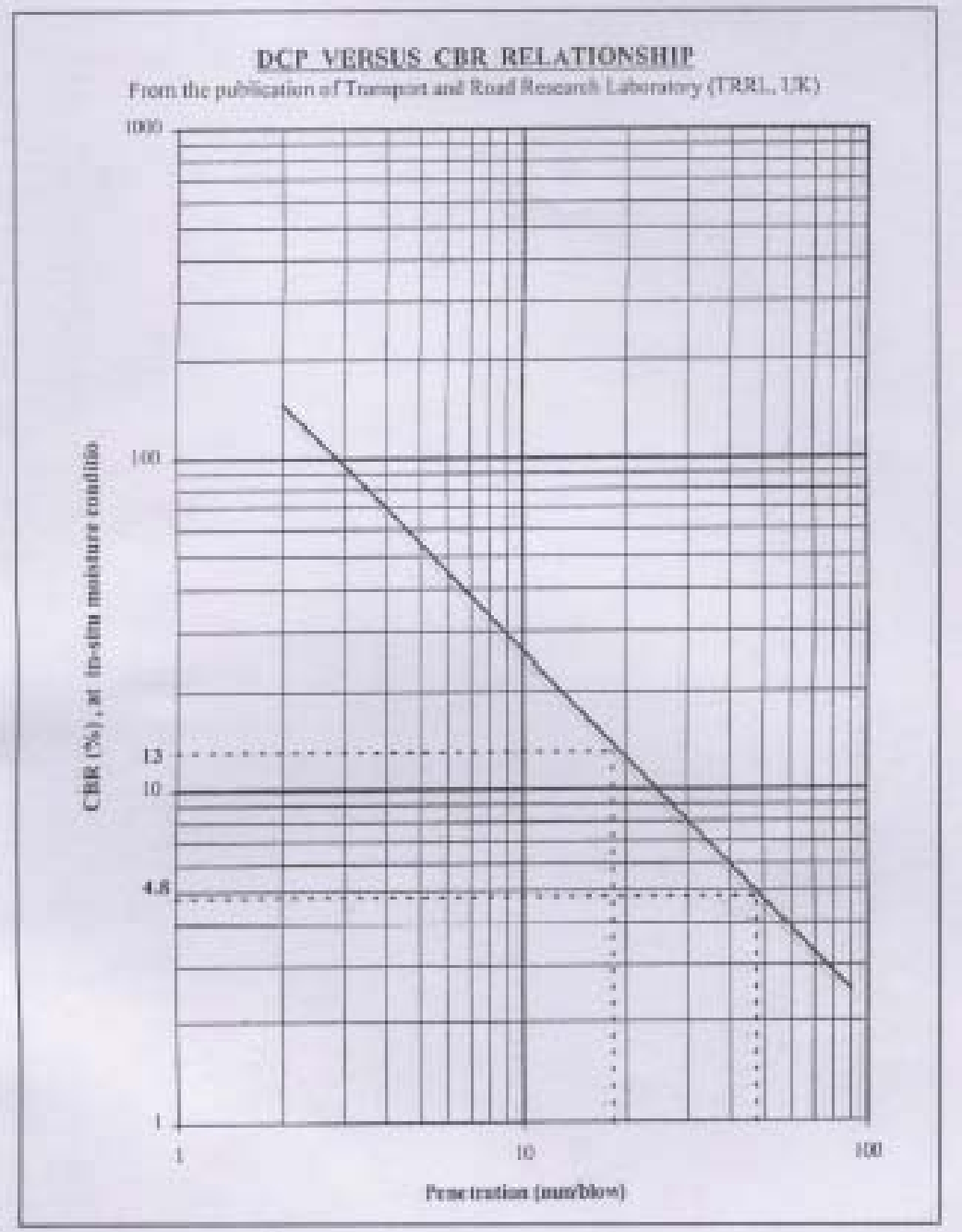


Figure 2: Relationship for Determination of CBR from DCP Test

Note: In LGED laboratories, DCP of Transport and Road Research Laboratory (TRRL UK) Model is used, with a 60° Cone and 8 Kg hammer of 575 mm free fall.

LOCAL GOVERNMENT ENGINEERING DEPARTMENT
DCP Data Collection Form

DISTRICT: NAWABGANJ **UPAZILA: NAWABGANJ-S**

Road Code : 1706620002 Road Type : Upazila Road Total Length : 2.2 km

Nowabgonj - Shibgonj R&H-Ramchandrapur GC Road

Survey Period :	Surveyed By :	Designation

Chainage	Base Course			Sub-Base			Improve Sub Grade			Sub Grade			Remarks
	No. of Blow	P. Depth (mm)	Thickness (mm)	No. of Blow	P. Depth (mm)	Thickness (mm)	No. of Blow	P. Depth (mm)	Thickness (mm)	No. of Blow	P. Depth (mm)	Thickness (mm)	

Roughness Survey

1. Introduction

The ARRB Roughometer is designed to measure the roughness of sealed and unsealed roads. Typical users include Local Government, Forestry and National Parks Management, etc. These organisations have a need for objective and repeatable assessments of their roads with a simple and portable system. The results of the measurements taken by the ARRB Roughometer II can be used to more effectively utilise maintenance resources.

Conventional laser based survey equipment employed for profilometry of sealed bitumen surfaces is unnecessarily precise and often expensive. The ARRB Roughometer II is a cost effective tool for this purpose.

The Roughometer II is very simple to use and can be easily and quickly fitted to most vehicles. All operations are controlled by five buttons and a two line LCD display.

The ARRB Roughometer II is designed to provide an objective and repeatable indication of road roughness. The output is in units of International Roughness Index (IRI) or NAASRA counts and typically correlates to the true value of IRI to within one IRI.

The accuracy of the results is dependent on the vehicle axle faithfully following the road surface profile at a relatively constant speed. Consequently, there is a dependence on vehicle mass, suspension and survey speed which may result in some survey results being outside the normal uncertainty limits.

Note: There is a GPS option available for the Roughometer II and this User Manual is written for the Roughometer II with GPS option. However, the Roughometer II can be operated without the GPS option and in this case, ignore the various discussions on the GPS option.

2. Hardware Installation

2.1 Data acquisition components

The major acquisition components are a distance measuring instrument (DMI), and the items shown in *Figure 2-1* and *Figure 2-2*. The vehicle odometer may be used instead of a DMI.

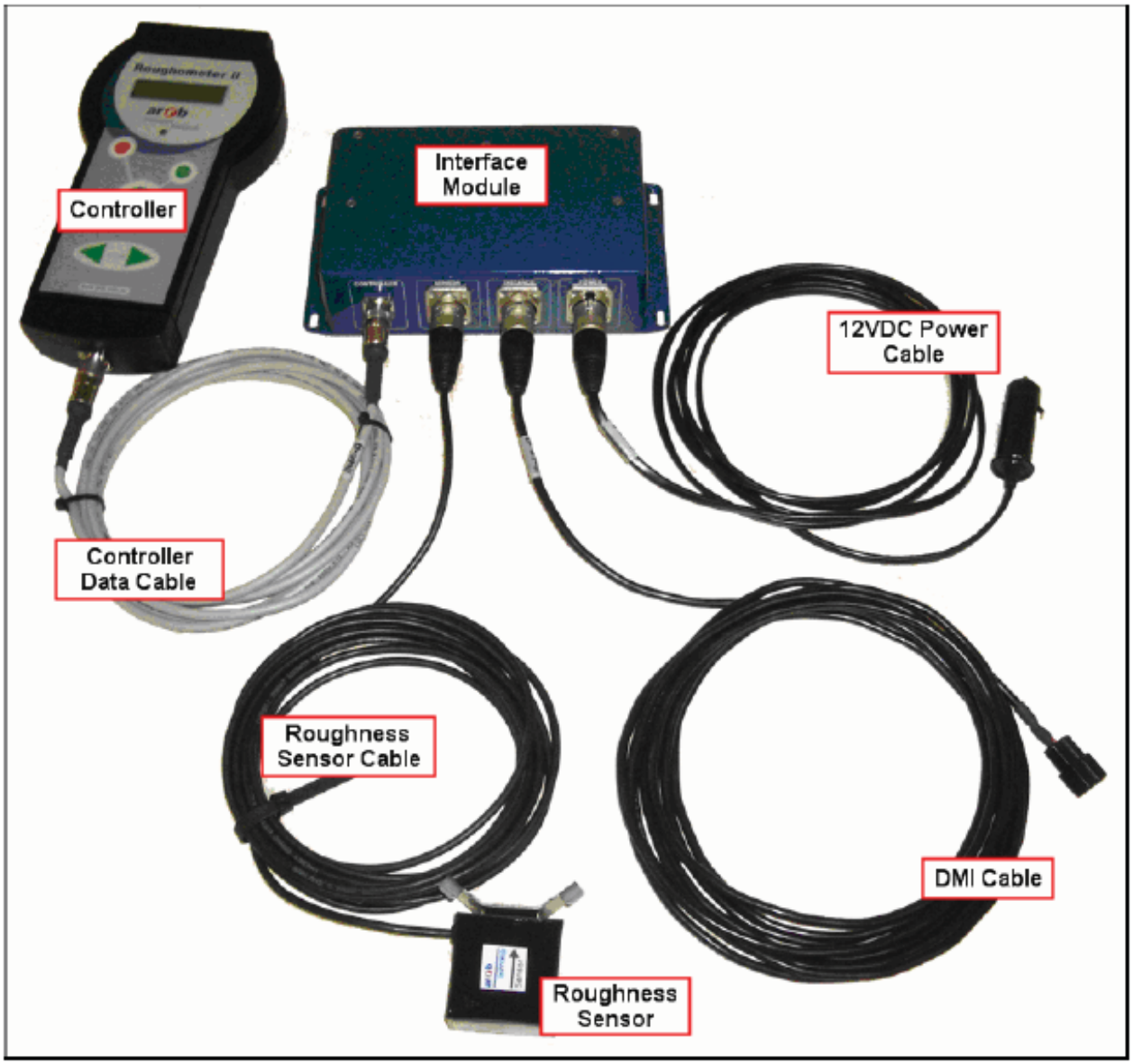


Figure 2-1 : Data acquisition hardware connections (excluding GPS option)

The optional GPS Receiver connections are shown in *Figure 2-2.*

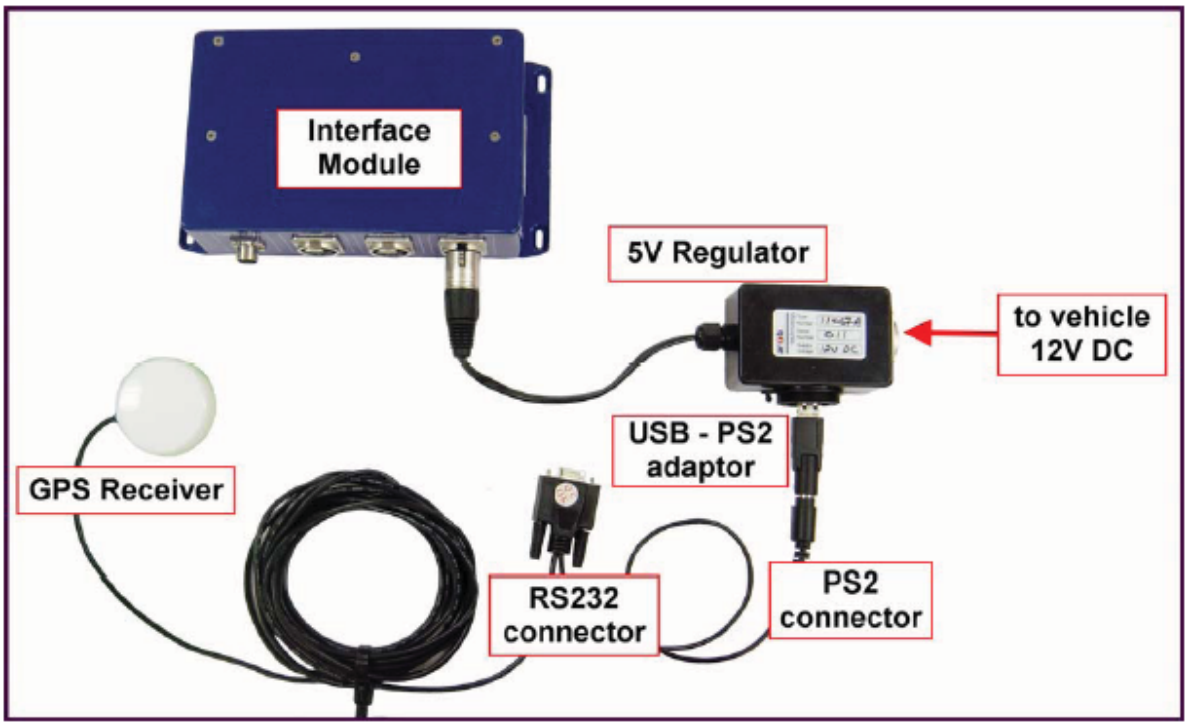


Figure 2-2: GPS Receiver (optional) data acquisition connections

2.2 Data processing components

The data processing components are shown in *Section 7.1*.

2.3 The Roughometer II Controller

The Controller is used by the surveyor to perform all the set up and survey functions. It provides operator feedback during the survey, accepts Control Point and Event inputs from the operator, and acquires Distance, Time and Roughness data. All data is stored in non-volatile internal memory. The Controller is operated using five keys (see *Figure 2-3*).

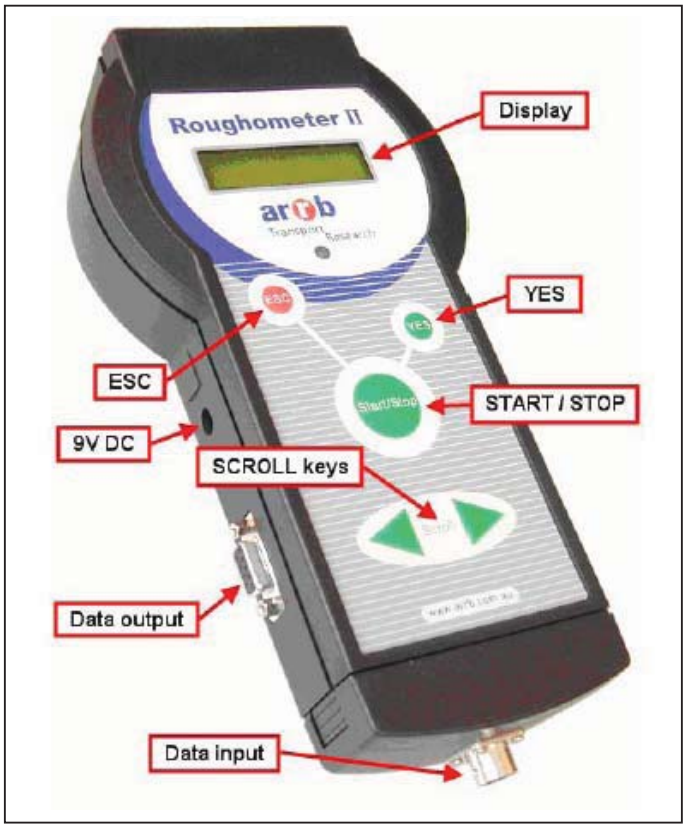


Figure 2-3 : Roughometer II Controller

The actions of the keys are described in detail throughout this manual but, briefly:

- Esc returns to the main menu
- Yes marks reference points during a survey and selects menu items
- Start/Stop starts and stops the collection of survey data
- The scroll keys ▶ and ◀ mark Events during a survey and scroll through menu items.

The Controller displays information and instructions relating to the various functions of the Roughometer II on the LCD Display. A typical message is shown in *Figure 2-4*.

Figure 2-4: Typical display text

Survey data is obtained from three devices:

- The Roughness Sensor
- The Distance Measurement Instrument (DMI) or the vehicle odometer
- Optional GPS Receiver (This operates independently of the Roughometer II Controller and has no connection to it)

2.4 GPS Receiver (optional) installation

The GPS receiver operates in isolation from the Roughometer II data logger, recording position information in its internal memory. Roughometer I and early versions of Roughometer II will require a firmware upgrade.

Place the receiver on the roof or dashboard of the vehicle at the commencement of the survey. It turns on and starts logging GPS data when power is applied, and ceases to record information when the power is turned off.

2.5 Connecting the GPS Receiver

Connections for data acquisition are shown in *Figure 2-2*. Power is supplied from the vehicle electrical system via a 5V DC regulator. The RS232 (DB9) connector is not used during data acquisition.

Note: Do not use an adjustable 5 Volt regulator device in case of inadvertent selection of a voltage other than 5 Volts.

Note: If you use a laptop computer to power the GPS Receiver, it is recommended that the power saving options are disabled for the duration of testing.

2.6 Roughness sensor installation

Read the relevant installation instructions through fully before proceeding.

Note: For best results, the roughness sensor should be calibrated prior to mounting on the vehicle. The calibration procedure is described in *Section 3.1*.

2.6.1 Vehicle without IRS (independent rear suspension)

It is recommended that the sensor bracket is installed onto the vehicle's rear axle, as close as possible to the driver's side wheel (see *Figure 2-5*).

Position the sensor so that it is orientated as near to vertical as possible. Secure the bracket to the vehicle axle using the hose clamp supplied. A small bubble level can be used to correctly orientate the sensor.

The arrow printed on the sensor face should face downward (see *Figure 2-6*).

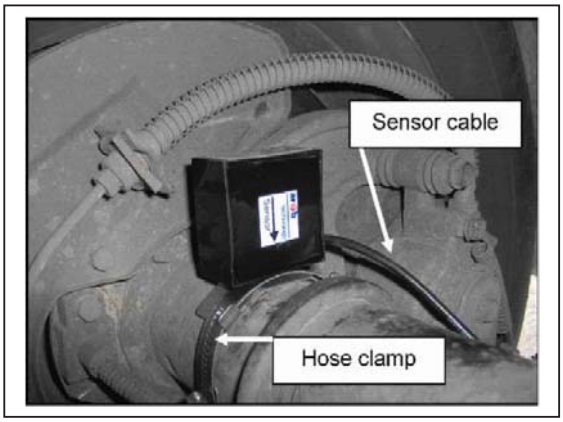


Figure 2-5 : Sensor fitted to rear axle

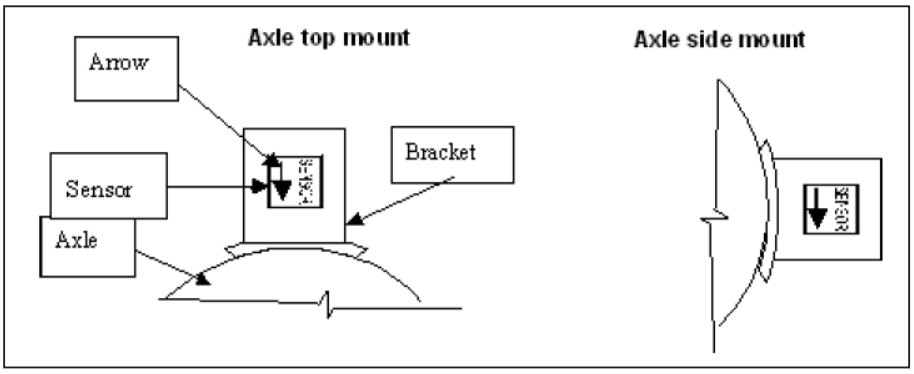


Figure 2-6 : Orientation of Roughness Sensor

2.6.2 Vehicle with IRS (independent rear suspension)

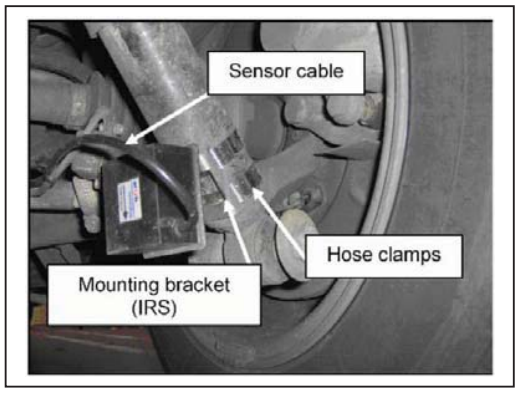


Figure 2-7 : Sensor fitted to vehicle with IRS (Independent Rear Suspension)

1. Attach the sensor to the flat plate of the mounting bracket with the two socket head cap screws. Use a 3mm Allen key to tighten the screws up to the point where the sensor can still be moved by hand relative to the bracket.
2. Check that the two parts of the mounting bracket are assembled with a flat M8 washer under both the screw head and the nut. An M8 star washer should be placed in-between the two parts of the bracket where they touch. Tighten the screw up to the point where it is firm, but where the two parts of the bracket can still be moved by hand. A 13mm open ended spanner and 6mm Allen key should be used for this.
3. Select two appropriately sized hose clamps (supplied). Use a flat bladed screwdriver to fully unscrew both.
4. Thread the bands of the two hose clamps through the two pairs of slots on the U shaped section of the mounting bracket. The bands will be tightened later, when the bracket is placed on the shock absorber.
5. Drive the vehicle up on ramps or place on a hoist, etc, to gain access to the rear wheel where the kit is to be fitted.
6. Place the hose clamps around the shock absorber (see *Figure 2-7*).
7. Thread the bands back into the clamps and tighten them loosely with the screwdriver.
8. It is essential that the sensor is mounted so that its sensitive axis is vertical. The arrow marked on the side of the sensor should point straight down. A bubble level or small spirit level can be used to measure whether the sensor is mounted correctly. The mounting bracket is designed to provide adequate adjustment in the position of the sensor. The bracket can be rotated around the shock absorber, as well as tilted in both “north-south” and “east-west” planes.

9. Position the mounting bracket as required and tighten up all screws. After tightening up the screws, use a level to check that the sensor has not moved.
10. Note that at least 40mm at the end of the shock absorber is required for successful mounting of the bracket. The installer should check that the bracket will not be hit by the shock absorber when the vehicle is driven.

Note: The device must be secured to the vehicle in such a way that it does not foul the operation of the vehicle. It is the responsibility of the installer of the device to ensure that the shock absorber, or any other part of the vehicle, does not hit the bracket or the roughness sensor attached to it.

Note: The length of travel for a serviceable shock absorber can be obtained from the vehicle manufacturer. This can be used to determine whether the device will foul the shock absorber. **A minimum of 40mm at the end of the shock absorber is required for successful mounting of the device.**

2.6.3 Routing the sensor cable

Note: It is essential that the sensor cable is safely and securely attached to the vehicle.

The following points should be considered:

- Ensure that the cable is routed in such a way that it does not interfere with any vehicle functions and is not exposed to exhaust heat
- Secure the cable using nylon cable ties (do not tie around hot items such as the exhaust pipe)
- It is recommended that the cable be sheathed in a suitable jacket such as split plastic flexible conduit supplied with the mounting kit
- For a temporary installation the cable can be routed to enter the vehicle through the rear window in the case of a sedan or under the tailgate in the case of a station wagon (estate car). Typically the cable is attached to the vehicle bodywork using adhesive pads and nylon cable ties.

2.7 Distance measurement

Distance measurement pulses are produced by either the vehicle's odometer or an externally fitted sensor such as the ARRB Distance Measuring Instrument which is a rotary encoder. Each pulse represents a certain distance which is measured by the Controller's Distance Calibration Procedure. The Roughometer II Interface Module is designed to readily accept inputs from several different types of distance sensor.

2.7.1 Using vehicle odometer output

The standard configuration of the Roughometer II kit is for distance pulses to be available from the vehicle odometer. This is the recommended connection for a permanent or longer term installation.

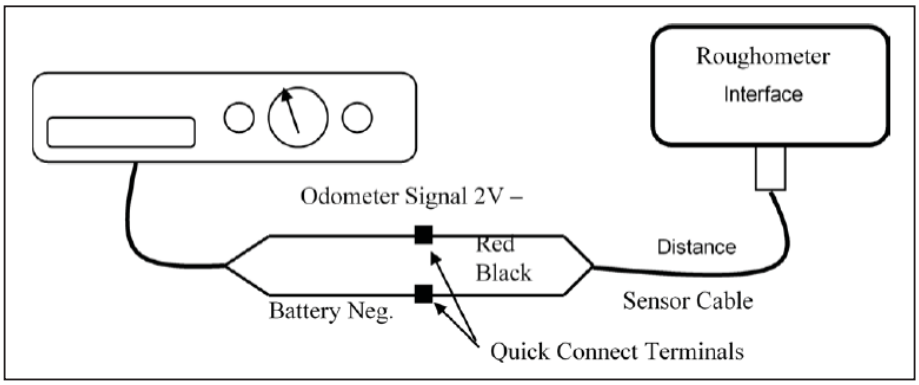


Figure 2-8 : Vehicle ODO connection

Figure 2-8 shows the connection to the vehicle's odometer pulses. The distance interface cable is supplied with quick connect terminals. The interface will accept pulses with an amplitude of between 2 and 12 volts.

Note: If the signal is from a transistor Open Collector or Open Drain, Link HD1 in the Interface Module must be inserted in position B.

In a small percentage of vehicles, the available distance pulse is less than 2 volts in amplitude. For these installations an in-line pulse amplifier (ARRB Part No. BF-SEN/VDO411096) is available to boost the signal. The amplifier is supplied with separate installation instructions.

Important Safety Notice: Connection to the vehicle's odometer system should only be done by a qualified auto electrician. Incorrect connections to the vehicle's electronics may affect the vehicle's speed measurement and/or engine management system.

2.7.2 Installing a temporary DMI

For a temporary application or where an electronic odometer signal is unavailable, a Distance Measurement Instrument (DMI) is available (see *Figure 2-9*). A variety of wheel mounted encoders with mounting kits are available from ARRB. Installation instructions are included in the DMI kit.

Figure 2-9 : Photo showing Rotary Wheel Encoder mounted on wheel

2.8 Data acquisition connections

For data acquisition, the equipment connections are as shown in *Figure 2-1* and, if you are using the optional GPS Receiver, *Figure 2-2*.

Make all connections before connecting power to the system.

12V DC power can be obtained from the vehicle cigarette lighter socket, or from the vehicle battery or a suitable accessory connection. Direct wiring is a better option as cigarette lighter connections can be unreliable.

2.9 Power on

Switch the power on at the Interface Module and check that:

- The green light (LED) on the Interface Module is illuminated
- The display on the Roughometer II Controller has cycled through the startup checks and the “New Survey” message is displayed
- The Roughometer II Controller has emitted an audio signal (2 beeps) indicating that the Controller is ready to collect Roughness data.

2.10 Controller menu

When the Roughometer II Controller has gone through its startup checks, the screen will display “New Survey”. The menu has seven items and the ▶ and ◀ scroll keys will take you in opposite directions around the cyclical menu.

The Menu items are:

- New Survey (see *Paragraph 4.2*)
- Memory Available (see *Paragraph 5.1*)
- Delete Data (see *Paragraph 5.2*)
- Calibrate Sensor (see *Paragraph 3.1*)
- Diagnostics (see *Paragraph 5.3*)
- Units – Metric (or Imperial) (see *Paragraph 3.2*)
- Distance Calibration (see *Paragraph 3.3*)

3. System Calibration

Before commencing a roughness survey, it is necessary to calibrate the devices that collect the survey data. Calibration is carried out in the vehicle that will be used for the survey. The quality of the data collected will depend on these calibrations; therefore the procedures should be followed carefully.

3.1 Calibrating the Roughness Sensor

The roughness sensor is sensitive to vertical motion. When correctly installed, it will accurately measure the vertical motion induced by the road surface profile as the vehicle is driven along the road. Calibration of the roughness sensor involves measuring the output from the sensor in both the normal and inverted orientations.

Calibrate Sensor
Yes to Select

Press YES to select the sensor calibration mode.

Sensor at 0 degs.
Esc or Yes

Hold the sensor against a vertical surface with the **sensor arrow pointing downward** (see *Figure 3-1*), and press YES .

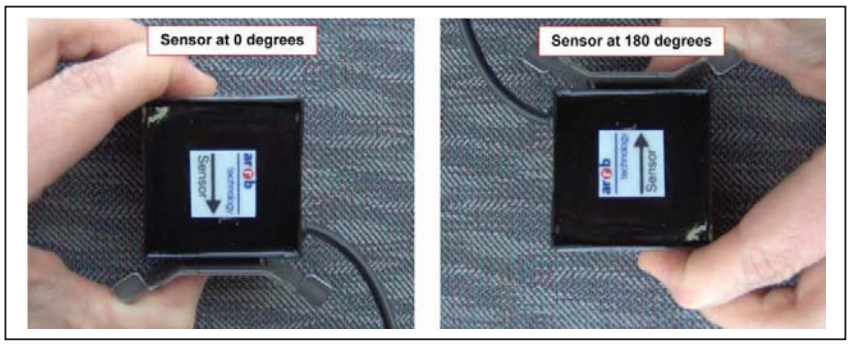


Figure 3-1: Roughness sensor calibration

Sensor = 2.52V
Esc or Yes

The output from the sensor is continuously measured and displayed. Adjust the sensor's vertical alignment (small movements) to achieve the **maximum** output voltage reading, then press YES .

Rotate 180 degs.
Esc or Yes

Rotate the sensor 180 degrees (arrow up, see *Figure 3-1*), then press YES .

Sensor = 1.68V
Esc or Yes

The display will change to show the sensor output voltage. The displayed voltage in this position will be less than the voltage displayed for the 0 degrees position. Adjust the sensor's vertical alignment to achieve the **minimum** output voltage reading, then press YES .

Old 3.11 New 2.44
Esc or Yes

The calibration value will vary from unit to unit but should be around 2.6. If the 'new' value differs greatly from the 'old' value or is greater than 3.5 or less than 2.0, press ESC and repeat the procedure.

If the calibration value remains outside the recommended values or is not repeatable, there may be a fault. Refer to *Chapter 6. Fault Finding*.

If the 'new' value is acceptable, press Yes and the Controller will be updated with the new calibration parameters.

Updating
Please wait . . .

The Controller will update the calibration value. This will take several seconds to complete and then the Controller will return to the **New Survey** mode.

Note: In practice, the calibration value does not vary significantly between sensors. A controller with a valid calibration factor may be used with more than one sensor. However, the sensor calibration routine must be performed with every new controller to ensure a valid calibration factor is stored in the controller.

3.2 Setting the measurement units (metric or imperial)

The Roughometer II Controller can be set to display survey distances in units of kilometres or miles. The appropriate units are also used in the calibration routines.

Select the Units change mode using the **Scroll** buttons.

Units – Metric
Yes to change

To change from Metric units to Imperial units (or Imperial to Metric) press YES .

Units – Imperial
Yes to save

To keep the current units setting, press ESC . The updating process will take several seconds to complete and the keypad is locked during this process.

Updating
Please wait . . .

3.3 Distance calibration

Accurate distance measurement is dependent upon the distance calibration. The Distance Calibration will vary considerably depending on the distance sensor, the vehicle type, wheel diameter and tyre pressure. A Distance Calibration must be performed whenever the system is installed on a vehicle.

Important: The calibration factor is stored in the Controller. If a new or different Controller is used, a calibration must be performed. A distance calibration involves driving the survey vehicle along a marked and measured track. The track can be from 100 metres to 2000 metres in length. When set to imperial units, the calibration distance is between 0.1 mile and 1.0 mile. A greater length of track will produce a more accurate calibration.

1. Position the vehicle at the start marker of the calibration track and select the distance calibration mode using the **Scroll** buttons.

Distance Cal.
Yes to select

Press Yes to select the Distance calibration mode.

Cal. Distance
1000m Scroll/Yes

Press **Scroll** to select the required calibration distance and press Yes .

At Start Point
Press Start

Press START/STOP to start the calibration.

Distance
Stop at end

2. Drive the vehicle along the measured calibration track at a steady speed and ensure that the vehicle wheels track as straight as is practical. The displayed distance will increment to show the distance measurement produced by the distance calibration settings.

3. Slow the vehicle as it approaches the end of the track and stop the vehicle precisely at the end marker. Press START/STOP .

Old 1002 New 1000
Yes Save or Esc

The selected Calibration Distance was 1000m. The **Old** value shown is the distance as measured using the current calibration parameters. The **New** value shown is the distance measured using the newly calculated calibration parameters.

Press YES to save the new calibration or press ESC if the New value indicated is not to be saved, for example because of inaccurate start or end positioning, or if for some reason the vehicle deviated from the true track.

The updating process will take several seconds to complete and the keypad is locked during this process.

Updating
Please wait . . .

The distance calibration procedure is now concluded.

On completion of the distance and roughness sensor calibrations, the Roughometer II is ready to be used in a roughness survey.

4. Performing a roughness survey

4.1 Introduction

Before using the Roughometer II for the first time, it is important that the correct date and time is set in the Controller. The procedure for this is described in *Paragraph 7.5*. When the data is subsequently downloaded, it is stored in folders which are named according to the survey date and time.

The simplest survey is one section from point to point with no events noted during the survey.

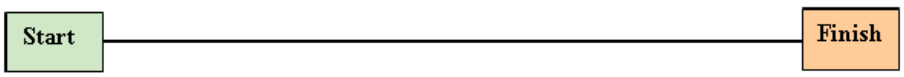


Figure 4-1: A single section survey

A more complex survey is one where the survey is divided into a number of sections.

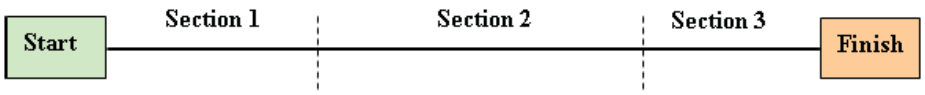


Figure 4-2: A three section survey

During the survey, it may be desirable to note the location of events of interest. For example, if the vehicle needs to cross a railway line or if there are some road works. These events will influence the roughness of that particular section and it is useful to have the events recorded along with the data to help explain any unusually high results. For example:

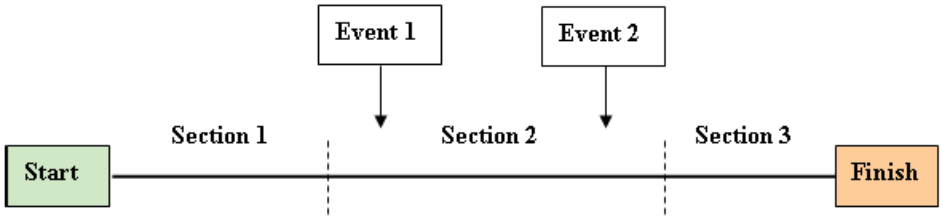


Figure 4-3: A three section survey with two marked events

During the Data Processing, Events 1 and 2 can be renamed as 'Rail crossing' and 'Roadworks' (for instance).

To optimise the processing of data, it is recommended that the survey include **'Lead-in'** and **'Leadout'** sections. The **Lead-in** is effectively data acquired before the first section, which allows the processing algorithm to prime the numerical filtering with some historical data before the first section of interest. The **Lead-out** improves data processing at the end of the survey.

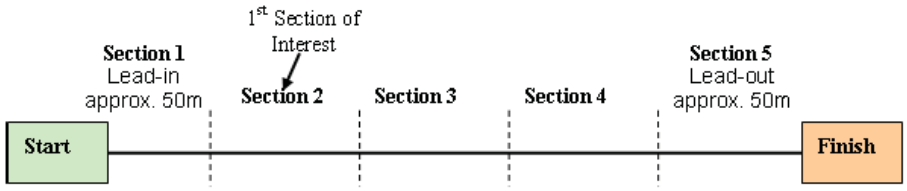


Figure 4-4: A three section survey with lead-in and lead-out sections

4.2 Performing a survey

Important Note: The synchronisation process described in *Section 7.5* must be performed every survey day, before surveying begins, particularly if you are using the GPS option.

At switch on or after **Esc**aping from any menu item, the Controller indicates the Survey Mode.

New Survey
Yes to select

Press YES to select the survey mode. The display will briefly show the amount of survey data memory available (displayed as **km** or **miles** of Survey),

275km of Survey
Memory Left

and then advance to the survey number.

Survey 1
Yes or Esc

The Controller will always display the number of the **next** survey.

For example, if 5 surveys had been completed and the Controller Unit turned off, the next time the Controller Unit is turned on, the survey number displayed would be Survey 6.

Press YES to prepare for the start of a survey.

Important Note: To improve accuracy and to ensure repeatability, it is important that wherever possible, a constant survey speed is maintained. Actual survey speed will depend on the road, but generally, a speed of 40 – 60 km/h (25 – 37 mph) has been shown to provide good results. The speed should be above 25 km/h (15 mph). The driver should reach the survey speed before pressing START/STOP . A survey speed below 25 km/h can result in significantly higher Roughness results. For sealed roads, a survey speed of up to 70 km/h is generally acceptable.

Note: There are inevitably situations where the driver will need to slow down to negotiate a turn or to allow for traffic conditions. The processing software can detect these occurrences and compensate to ensure the low speed results do not influence the surrounding valid results. See *Paragraph 7.7.4* for more details.

Note: It is important that the vehicle speed be up to the survey speed as you cross the start point, and is still travelling at the survey speed as you cross the end point.

Press START/STOP approximately 50 metres (yards) or more before the start (if possible) of the section to be surveyed. This ensures that the data processing software has enough information to perform the roughness calculations and is referred to as the **Lead In**. The display will change to indicate the distance travelled.

To Start Survey
Press Start

Metres . . . .
Yes Stop or Esc

During the survey it is possible to enter control points and event markers into the data. Control points are typically used to mark the start point of the survey (after the **Lead In**) and to separate sections within the survey.

Event Markers are used to show the location of points of interest along the survey route.

Press the YES button to enter a single **Control Point**.

Press either **Scroll** button to enter an **Event Marker**.

If conditions allow, accuracy at the end of the survey can be improved by inserting a Control Point at the end of the survey section. Press Yes then continue for approximately 50 metres (or as far as is practical) past the end point before pressing START/STOP.

This additional information is required by the data processing software and is referred to as the **Lead Out**. At the end of the **Lead Out**, press START/STOP .

The Controller will automatically complete the data saving process and ready itself for the next survey.

New Survey
Yes to select

The Roughometer II has storage capacity for up to 275 kilometres (171 miles) of survey. This can consist of up to 100 individual surveys.

The survey operations are shown diagrammatically below.

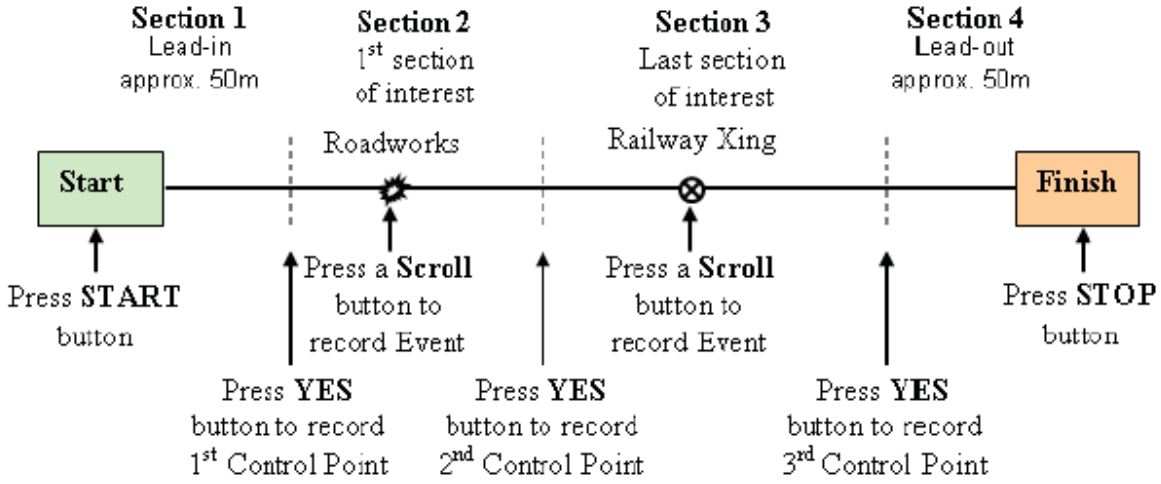


Figure 4-5: Example of survey operations

To provide an audible confirmation of the progress of the survey, the Controller emits a 'beep' every 100 m during the survey. The 'beep' is purely for operator feedback and is not related to the roughness processing interval. The beep can be disabled or enabled by pressing **both Scroll** buttons simultaneously.

5. Ancillary Functions

The Roughometer II has a number of other functions which are used to check the functionality of the unit as well as assist in diagnosing faults. They can be accessed by **Scrolling** to them in the Main Menu. The functions are listed below.

5.1 Memory check

Memory Available
Yes to select

Press YES to see how many kilometres or miles of survey memory are available.

275km Of Survey
Esc to Return

5.2 Deleting data

Once all data has been uploaded, the memory space should be cleared.

Delete Data
Yes to select

This will erase all survey data.

Are you sure?
Yes or Esc

Press YES .

Erasing Page :0
Block:1 OK

The data memory consists of 8 pages (Page 0 – 7) and each page has 16 blocks (Block 0 – 15). The program checks each block and erases all data. The process takes about one minute and then the following screens will display briefly.

Writing
Calibration Data

Survey Log
Created.

The unit is then initialised in readiness for the new survey data.

5.3 Diagnostics

The Diagnostics mode enables the user to check that the sensor signals are valid and that they are being received by the Controller.

Diagnostics
Yes to select

Before commencing a new day's surveying it is a good idea to check the distance pulses and the Roughness Sensor output.

Press YES .

Pulses 1998
Sensor 2.50V

The distance sensor count should show roughly 2000 counts (Pulses xxxx) per rotation of the tyre (depending on the size of the wheel). This assumes a distance calibration has been performed. The number of counts will also be different for the vehicle odometer and a DMI sensor.

The Sensor Voltage should be around 2.5V +/- 0.2V.

5.4 Error messages

When the Roughometer II system is switched on, a number of setup procedures and tests are carried out by the internal program in the Controller.

The first message displayed is the product name and program revision.

ARRB Roughometer
Version 2.3

Then:

Reading
Calibration Data

If any problem is found with the calibration:

Cal. Not Valid
Re-calibrate

Applying Default
Settings

Setting Distance
Pulse Interface

At this point in the setup, the Controller memory is checked. The following message indicates there was a problem with the check:

Memory Fault. Pls
Power OFF and ON

Follow the displayed instruction (switch the power to the Controller off and on again). The Controller will cycle through the above checks and messages accordingly.

If the memory fault message persists, please contact ARRB for service (see details on *Page i*).

At this point all hardware tests have been completed successfully.

The Controller is now ready for survey preparation.

Reading Current Survey Setup Log

If, for example, the Controller power supply is interrupted, this may temporarily corrupt the various information fields in the Controller memory. The program examines the information fields. If an error is found:

Current Survey Log Not Valid

followed by the beeper sounding.

The various memory parameters are then reset.

Setting Default Log Parameters

Log Not Valid Reset Survey

Searching for Free memory

The Controller has now completed the test and setup procedures necessary for reliable survey data collection.

6. Fault Finding

The following section describes a number of fault scenarios which may be encountered by a user, either at installation or after the unit has been in service for some time.

6.1 Controller appears dead

Problem: Unit plugged in but no sign of life on the Controller:

- Check all connections into the Interface Unit and confirm that the power switch is on. The vehicle ignition may need to be in the **Accessory** position.
- Check that the main power LED is illuminated.
- If the main power LED is not illuminated, first check the fuse in the Interface Module, and then in the vehicle fuse box.
- If the fuse in the Interface unit is blown and a replacement blows as well, contact ARRB.
- If the vehicle fuse is blown, remove the Roughometer II Interface unit power connector from the cigarette lighter plug and replace the fuse. If it blows again, check with an Auto Electrician. If the vehicle fuse only blows when the Roughometer II interface is plugged in, there may be a fault with the unit or the power cable. Check the power cable and/or contact ARRB.

6.2 No distance pulses in the Diagnostics display

Problem: Controller appears to be working, but no distance pulses are evident in the Diagnostics display:

- Check if the Distance LED on the front panel flashes as the vehicle rolls forward. With a high resolution wheel transducer, the pulses will be very quick and it may appear that the LED is permanently on, whereas with the vehicle odometer, they will be much slower.
- If there are Distance LED flashes on the interface, but no distance indication on the Controller's diagnostics display, then the most likely fault is the controller cable. Try a spare or contact ARRB.
- If there are no Distance LED flashes on the interface, then the distance transducer connection could be faulty. Check the cable.
- If the distance pulses are from the vehicle's ODO, it may be possible to check the presence of the pulses at the connection between interface box and the vehicle wiring (see *Figure 2-8*).
- If the distance pulses are from the optional wheel encoder, check by swapping with a spare.

6.3 No output from the Roughness Sensor

Problem: Controller appears to be working, but no output evident from the Roughness Sensor:

- Check if the Roughometer II sensor LED flashes on the Interface Module as the vehicle is driven over some bumps.
- If there are Roughness Sensor LED flashes on the interface, but the Roughness voltage indication on the Controller's diagnostics display is static, then the most likely fault is the controller cable. Try a spare or contact ARRB.
- If there are no Roughness Sensor LED flashes on the Interface, then the Roughness sensor connection could be faulty. Check the cable.
- Plug a spare Roughness sensor into the Interface Module and check for a signal. With the sensor vertical and the arrow pointing down, the Controller should display around 2.5V. With the sensor inverted it should display around 1.7V. If there is still no signal, there may be a fault with the Interface Unit. Contact ARRB.

6.4 Nonsensical Survey Numbers or Memory Remaining

Problem: The display shows nonsensical Survey Numbers or Memory Remaining:

- The Controller may have received a power glitch during acquisition which has corrupted the file pointer. Check the cigarette lighter connection.
- If possible, download data from Controller.
- Delete all data in the Controller to reset memory pointers.

6.5 Error. Could Not Write Data, and Error. Aborting Survey

Problem: The display alternates between 'Error. Could Not Write Data' and 'Error. Aborting Survey':

- The data memory may be full and the Controller is unable to write to an empty location;
- A section of data memory may not have been erased completely;
- There may be a faulty memory chip.
- If possible, download data from Controller.
- Delete all data in the Controller to reset memory pointers.
- Contact ARRB (see details on Page i) if these error messages persist.

6.6 Mouse pointer moves randomly when GPS receiver is connected

In some cases, the Windows mouse pointer may move randomly about the display and behave as though buttons are being pressed whenever a GPS receiver is connected and switched on. This is caused by Windows misidentifying the GPS receiver as a serial mouse. This problem is acknowledged by Microsoft, and is discussed in Microsoft Knowledge Base article 283063.

This problem may be solved either by adding a registry key to prevent Windows from misidentifying the GPS receiver as a mouse (discussed in the Microsoft Knowledge Base article), or by disabling the mouse device.

To disable the mouse device:

- Disconnect the GPS receiver to restore normal mouse pointer behaviour. If the GPS receiver is connected via some kind of adaptor, such as a USB to serial adaptor, leave the adaptor connected to the computer, and just disconnect the GPS receiver itself.
- Open the **System** control panel. (select **Start | Settings | Control Panel | System** or right-click **My Computer**), and select **Properties** from the menu.
- Select the **Hardware** tab and click the Device Manager… button (see *Figure 6-1*).

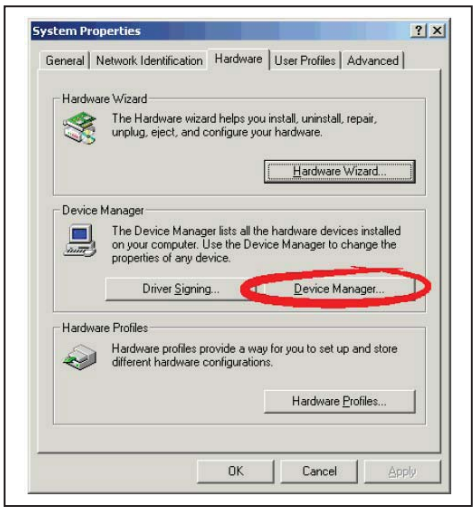


Figure 6-1: System Control Panel

- The Device Manager will open (see *Figure 6-2*), showing a list of the kinds of devices installed in the system. Expand the **Mice and other pointing devices** section by clicking the small plus sign to the left. Any pointing devices connected to your computer will be shown.

- If the GPS receiver was connected directly to a serial port on the PC or via a USB to serial adaptor, a non-existent **Microsoft Serial BallPoint** or **Microsoft Serial Mouse** device will appear in the list. If the GPS receiver is connected to the PC via USB, it must be reconnected before the device will appear. Note that the mouse pointer may move randomly as soon as the GPS receiver is connected.

- Select the non-existent **Microsoft Serial BallPoint** or **Microsoft Serial Mouse** device and click the disable button in the toolbar (see *Figure 6-2*). Windows will display a dialog asking whether the device should really be disabled. Click the Yes button.

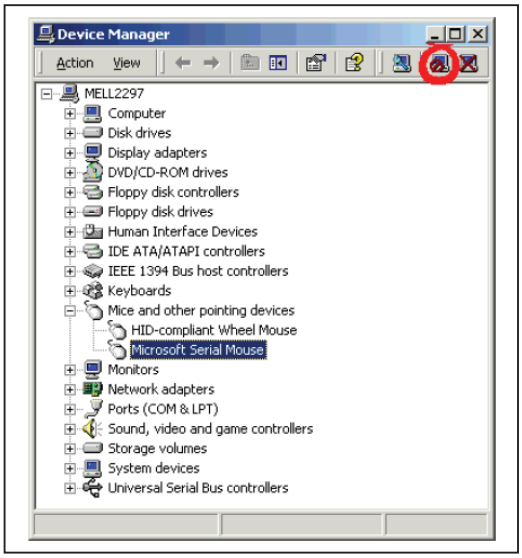


Figure 6-2: Device Manager showing non-existent Microsoft™ Serial Mouse

- The non-existent mouse device will have a small, red “x” superimposed on its icon to indicate that it has been disabled (see *Figure 6-3*).

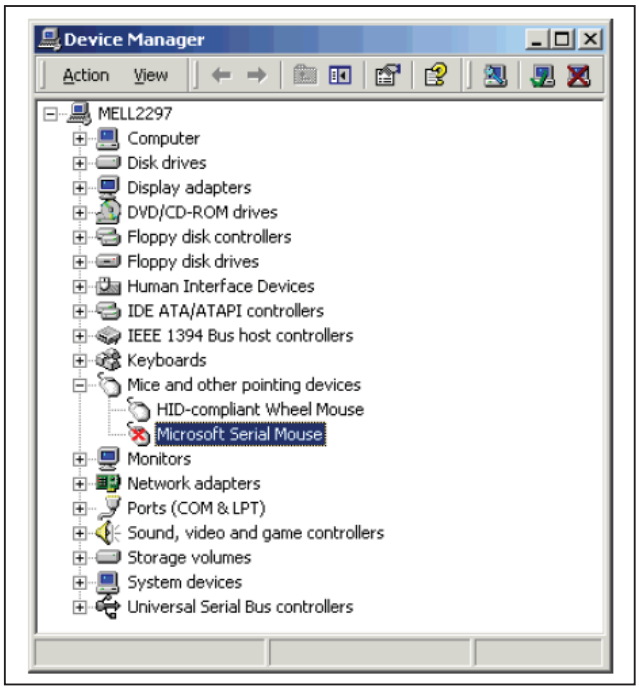


Figure 6-3: Device Manager showing disabled mouse device

- Reconnect the GPS receiver if necessary.

7. Data Processing

7.1 Processing hardware setup

The major data processing components are a computer (not supplied), the processing software CD, and the items shown in *Figure 7-1* and *Figure 7-2*.

7.1.1 Roughometer II Controller

The Roughometer II Controller is powered by a plug pack with a 9V DC output and the RS232 data output is connected either to an RS232 port on the computer, or to a USB port via an RS232 – USB converter.

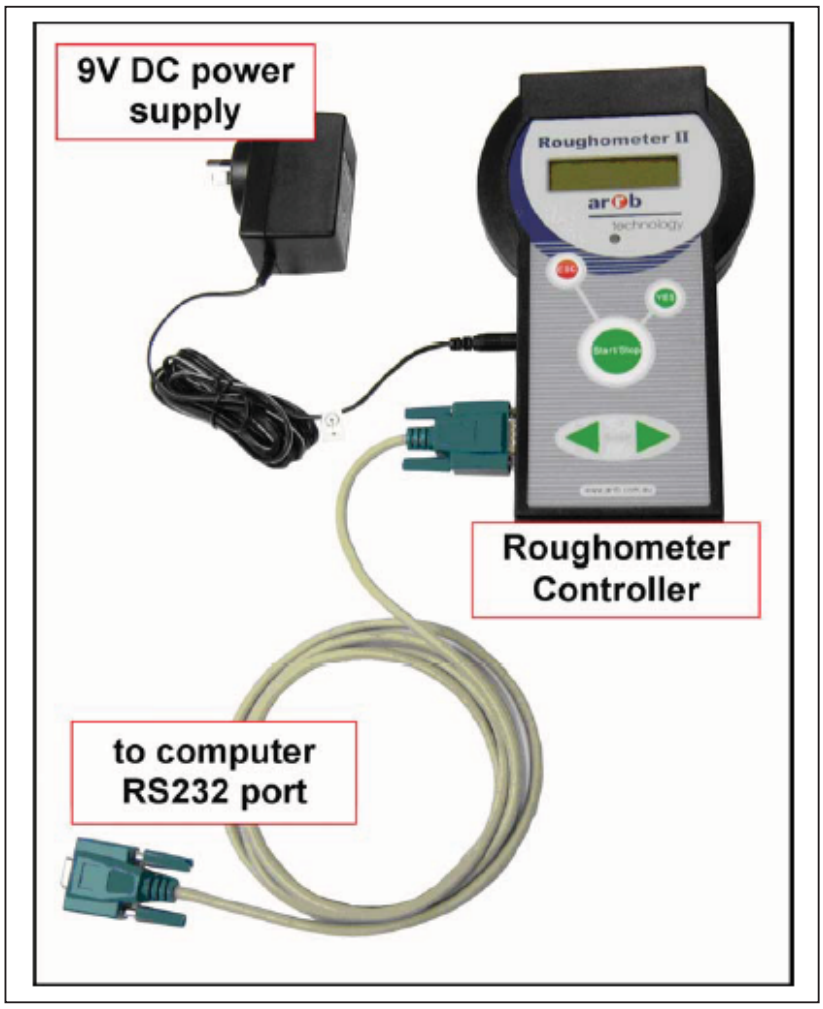


Figure 7-1: Data processing connections (Roughometer II Controller)

7.1.2 GPS Receiver

The GPS Receiver is powered from a spare PS2 port on the computer (a PS2 splitter can be used to create a spare port), or a USB port via a PS2 – USB adaptor.

The RS232 data output is connected to either an RS232 port on the computer, or a USB port via an RS232 – USB adaptor.

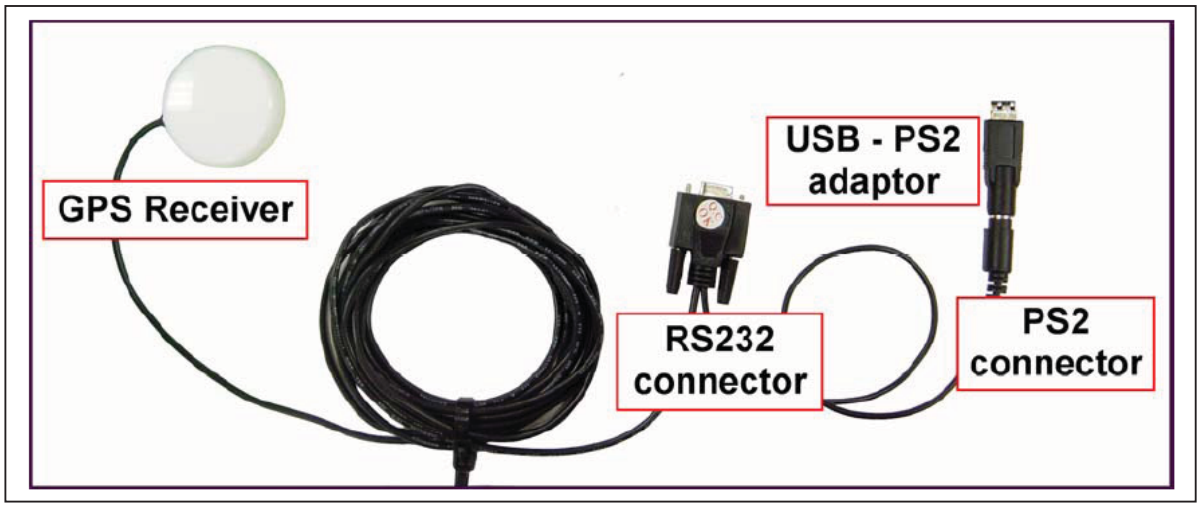


Figure 7-2: Data processing connections (GPS Receiver)

7.1.3 Using a serial port to USB adaptor

As stated in *Paragraph 7.1.1* and *Paragraph 7.1.2*, an RS232 serial port to USB adaptor can be used with the Roughometer II Controller and/or the GPS Receiver.

Ensure you have installed a driver for the USB to Serial Port adaptor and that Windows recognises it. This is not Roughometer II software related. If the adaptor is not recognised, the Roughometer II program will be unable to download from it.

7.1.4 Minimum processing computer requirements

The minimum recommended computer requirements are:

- IBM[1] Compatible PC
- Pentium II 300 MHz CPU
- 128 MByte RAM
- 1 GByte free hard disk space
- Microsoft Windows[2] 98, 2000 or XP operating system.

Note: If you use a laptop computer to power the GPS Receiver, it is recommended that the power saving options are disabled for the duration of testing.

7.2 Installing the software

The Roughometer II processing software is provided on a CD and is very easy to install and use.

Note: If any previous version of the Roughometer II software exists on the computer, it should be 'uninstalled' before the installation of the new software.

To install the software on the processing computer:

1. Insert the Roughometer II CD into the drive.
2. Choose **Run** from the **Start** menu, browse to the CD Drive and enter **setup** in the dialog box,

OR

Use **My Computer** or **Windows Explorer** to go to the CD drive, and then double click on **setup.exe**.

3. Click Install (see *Figure 7-3*) then follow the on-screen instructions to complete the installation.
4. When the software installation is complete, drag the Roughometer II program icon onto the Windows desktop.

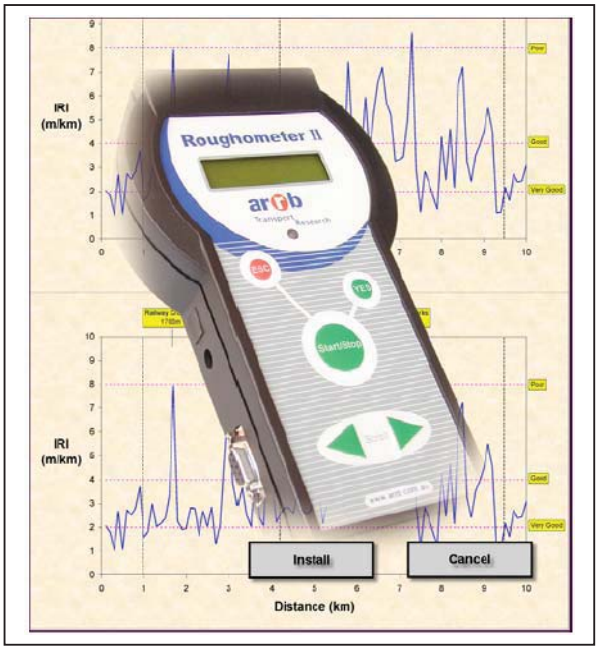


Figure 7-3: Installing Roughometer II processing software

7.3 Starting the software

Double click on the Roughometer II program icon and the **About Roughometer II** screen will open together with a **GPS Option** dialog (see *Figure 7-4*).

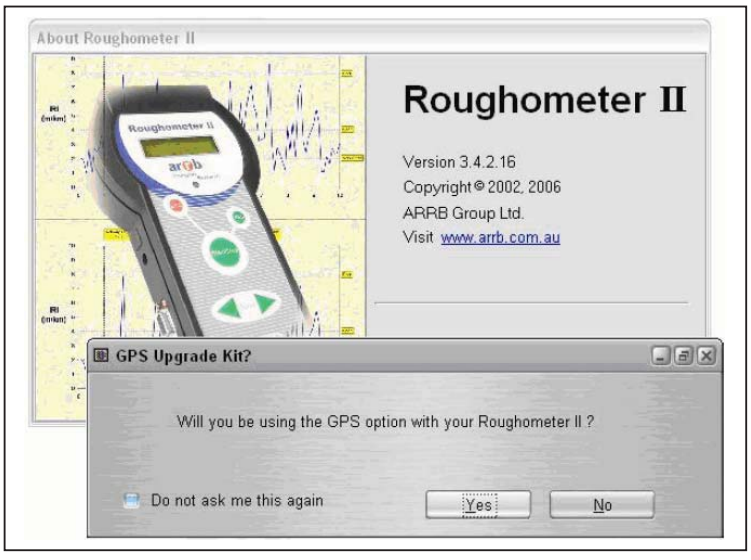


Figure 7-4: GPS option question

Click Yes or No , as appropriate, and the main window will open (see *Figure 7-5*).

Note: If you check the **Do not ask me again** box, this GPS option question will never appear again. The only way to get it back is to edit the "Roughometer Configuration.xml" file. Use a text editor to change the line `<AskAboutGPS>True</AskAboutGPS>` to `<AskAboutGPS>False</AskAboutGPS>`.

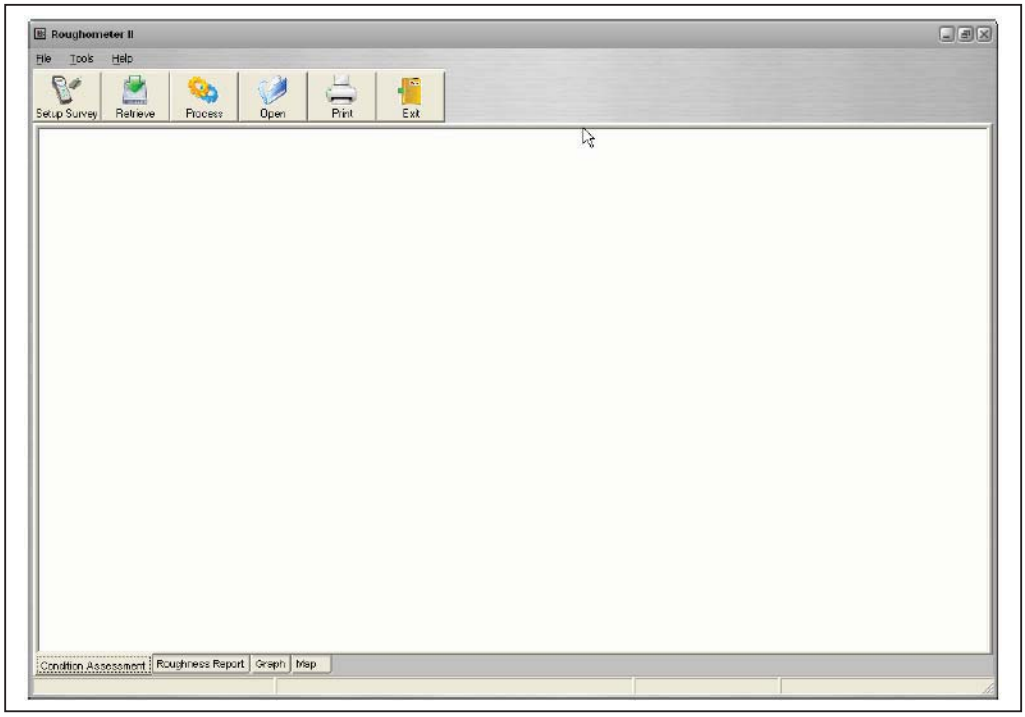


Figure 7-5 : Main window

If you are not using the GPS option, you will not see a **Map** tab in the bottom left corner of the window.

7.4 Roughometer II toolbar

The Roughometer II toolbar (see *Figure 7-6*) consists of six buttons which provide fast access to the data retrieval and processing functions. The buttons are repeated as items in the **File** menu.

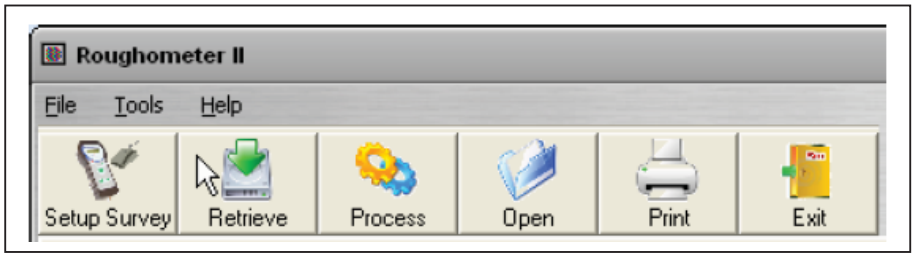


Figure 7-6 : Desktop tabs

The desktop buttons (and File menu items) are:

- Setup Survey - used to set up the Roughometer II and GPS Receiver before a survey
- Retrieve - used to upload survey data from the Roughometer II and the GPS Receiver

- Process - used to process uploaded survey data.
- Open - used to open previously generated reports.
- Print - used to print graphs and reports.
- Exit - will close the application.

7.5 Survey setup

Before starting a survey, it is necessary to synchronise the Roughometer II time and GPS time to the processing computer time so that survey data from the Roughometer II and GPS receiver can be merged.

Note: The computer that is used to synchronise the Roughometer II and the GPS receiver must be the same one that is subsequently used to Retrieve the data from them after a survey.

Note: Synchronisation must be performed every survey day, before beginning surveying, particularly if you are suing the GPS option.

7.5.1 Setting the GPS option

Select **Tools | Application Options . . .** to open the dialog of *Figure 7-7*.

Figure 7-7: Setting the GPS option

If you are using a GPS receiver, check the **I am using the GPS option with my Roughometer**, and click OK .

7.5.2 GPS setup

Click Setup Survey on the toolbar or select **File | Setup Survey** from the main menu to open the dialog of *Figure 7-8*.

Connect the GPS receiver to a serial or USB port on the computer, turn on the power to the GPS receiver and wait for the computer to find the GPS receiver.

Note: If you are not using a GPS receiver, the setup will skip this section and go to the Roughometer II setup (see *Paragraph 7.5.3*).

Figure 7-8: Searching for the GPS receiver

When the receiver is found, the **Status** will change as shown in *Figure 7-9* while communications are established.

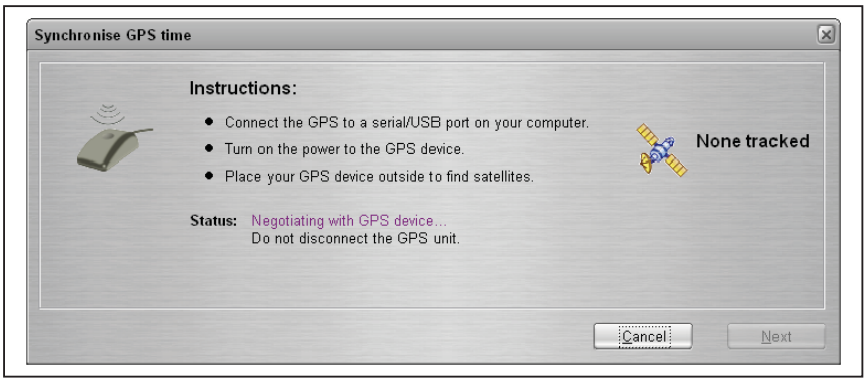


Figure 7-9: Establishing communications with the GPS receiver

Once communications are established, the GPS receiver will begin searching for satellites (see *Figure 7-10*). This may take up to 15 minutes if the receiver is tracking satellites for the first time in a new region. After the first time, it should only take 2 – 3 minutes.

Note: The GPS receiver must be in the open air with a clear view of the sky or it will not track satellites. Cables are supplied to enable the GPS receiver (outside) to be up to 20m from a desk top computer inside the building.

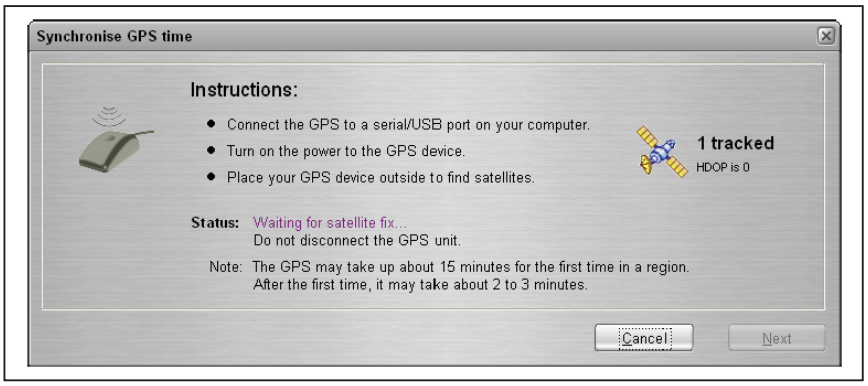


Figure 7-10: Searching for satellites

When the search is completed, all data will be erased from the GPS receiver in preparation for the next survey (see *Figure 7-11*).

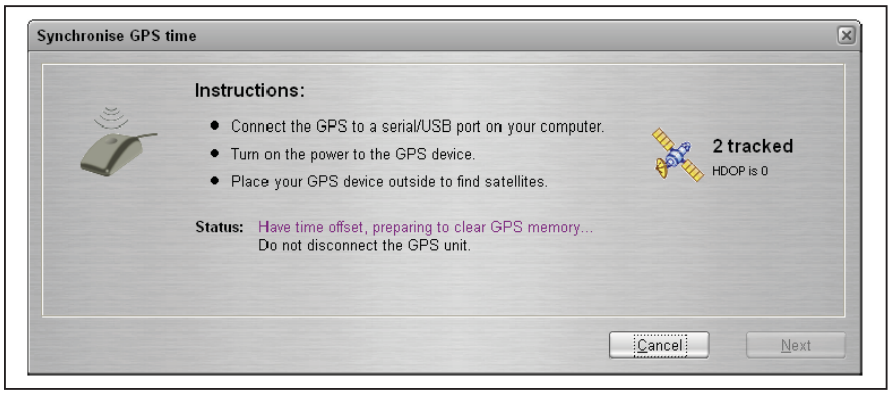


Figure 7-11: Erasing data from the GPS receiver

The Next button will then become available and you can proceed to the Roughometer setup.

7.5.3 Roughometer II setup

Click Setup Survey on the toolbar or select **File | Setup Survey** from the main menu to open the dialog of *Figure 7-12*. Connect the Roughometer II to a serial or USB port on the computer, turn on the power to the Roughometer II and wait for the computer to find it.

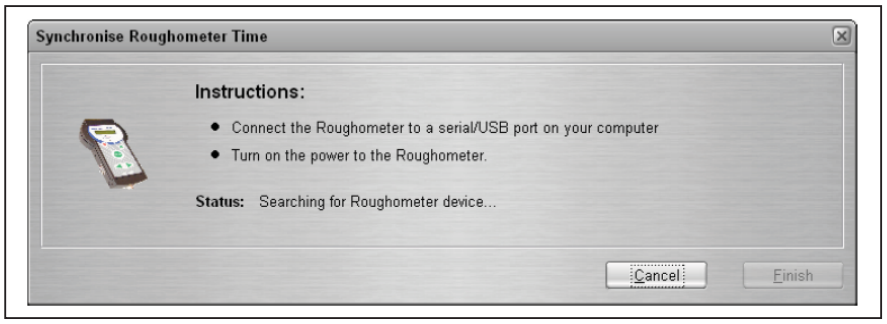


Figure 7-12: Searching for Roughometer

When the Roughometer II has been found and synchronised to the computer (see *Paragraph 7.5.3*), click Finish to end the setup. The Roughometer II is ready for surveying.

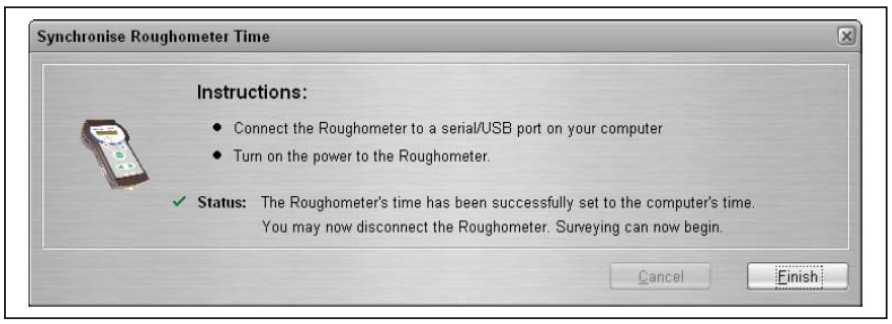


Figure 7-13: Finishing Roughometer synchronization

7.6 Retrieving survey data

After a survey, data must be retrieved from the Roughometer II and the GPS receiver for archiving and report processing.

7.6.1 Roughometer II data retrieval

Click Retrieve on the toolbar or select **File | Retrieve** from the main menu to open the **Retrieve Roughometer Survey/s** dialog of *Figure 7-14*.

Connect the Roughometer II to a serial or USB port on the computer and turn the Roughometer II power on. The computer will search for the Roughometer.

> **Note:** The computer that is used to Retrieve the Roughometer II and the GPS receiver data must be the same one that was used to synchronise them prior to the survey.

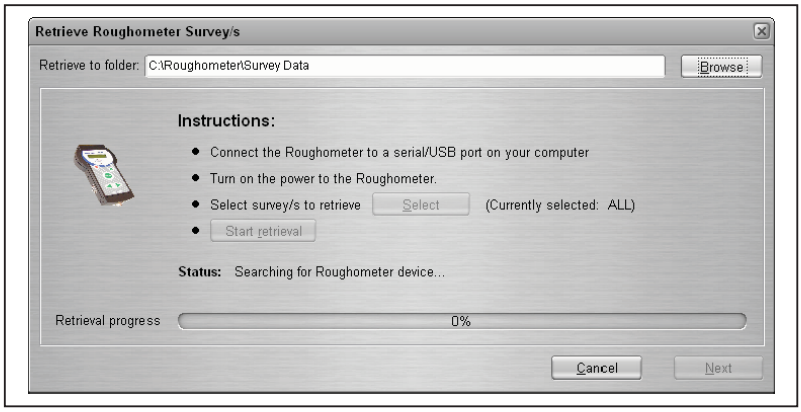


Figure 7-14: Searching for the Roughometer

The default folder for the retrieved data is “C:\Roughometer\Survey Data”. To change the folder, click Browse to open the standard Windows dialog, and select a new folder.

When the Roughometer has been found, click Select to open the survey selection dialog (see *Figure 7-15*). Check the files that you want to upload or check **Select ALL files** (default) to upload all files in the Roughometer II. Click OK to close the dialog.

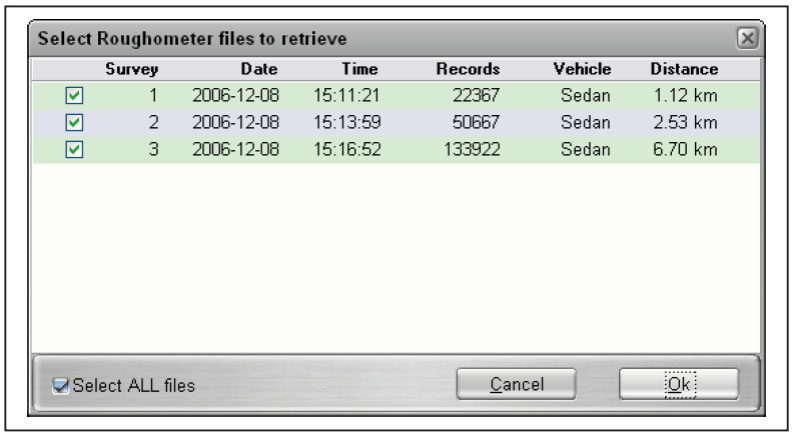


Figure 7-15: Selection of survey files to retrieve

Important Note: If any of the listed surveys has an excessive and obviously incorrect length, deselect it. If the software attempts to retrieve such a file, it may stall (hang up).

Click Start retrieval to upload the data. Progress of the upload is displayed on the **Retrieval progress bar** at the bottom of the dialog

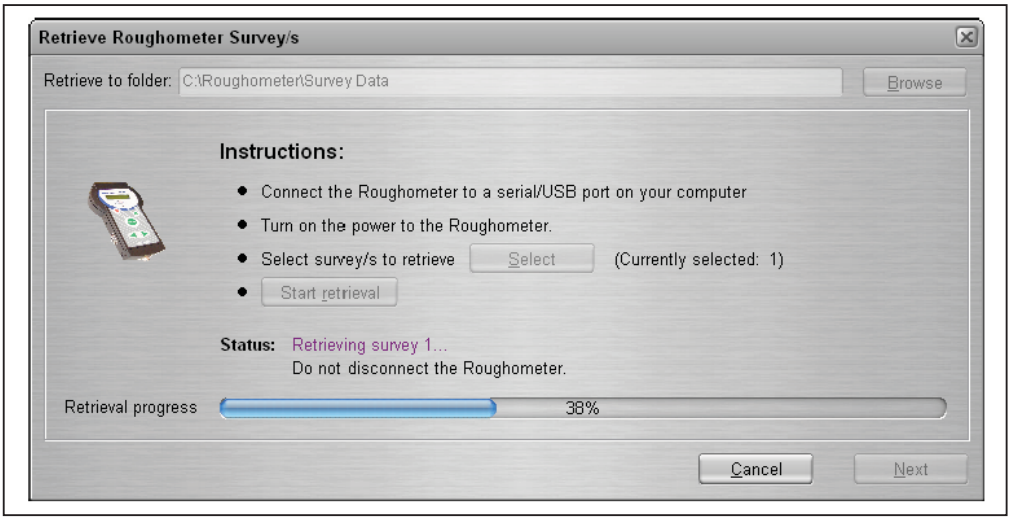


Figure 7-16: Retrieving Roughometer survey files

When retrieval is finished, click Next to proceed to the GPS data retrieval. If you have not used a GPS receiver, click Finish to end data retrieval. Note that the Next and Finish buttons are the same button.

Note: GPS data files are deleted by the Roughometer II software in Survey Setup (see *Paragraph 7.5.2*) but Roughometer II data files can only be deleted by the Roughometer II device itself (see *Paragraph 5.2*).

7.6.2 GPS data retrieval

If you have used a GPS receiver for the survey, the GPS data retrieval dialog (see *Figure 7-17*) will open after Roughometer II data upload has completed. If there is no GPS data available, click Skip to end data uploading without losing the Roughometer II data.

Connect the GPS receiver to a serial or USB port on the computer and connect power to the GPS receiver. The computer will automatically find the GPS receiver and start the data upload. Retrieval progress is displayed on the bar at the bottom of the dialog.

Click Finish to end data retrieval.

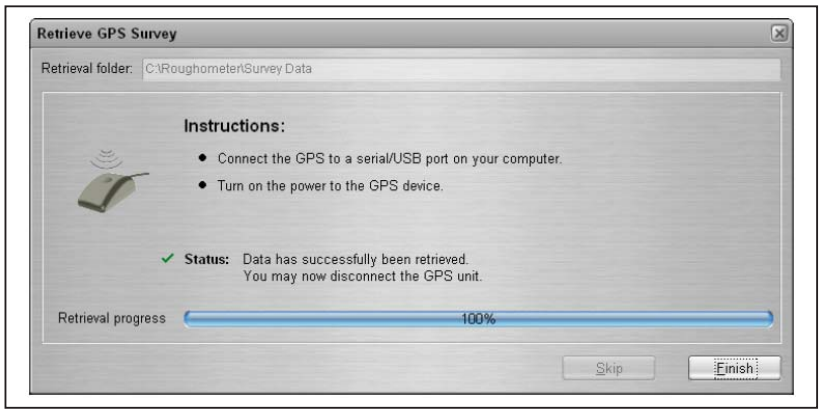


Figure 7-17: Retrieving GPS data

7.6.3 Roughometer II data files

Two files are generated by the Roughometer II. The names of both are formatted in the following way:

"**YYYY**-**MM**-**DD** **HH**h**NN**m**EE**s Survey **V**" where

YYYY is the year, **MM** is the month, **DD** is the day of the survey

HH is the hour, **NN** is the minute, **EE** is the second of the start of the survey, and

V is a survey number which is assigned by the Roughometer II

An example is:

2006-12-07 11h39m27s Survey 3

The file with the extension **.cpt** contains the survey data while the file with the extension **.ipt** contains survey configuration data.

7.6.4 GPS data file

The GPS receiver generates a single file formatted as follows:

"**YYYY**-**MM**-**DD** **HH**h**NN**m**EE**s GPS.pos" where

YYYY is the year, **MM** is the month, **DD** is the day of the survey, and

HH is the hour, **NN** is the minute, **EE** is the second of the start of the survey

An example is:

2006-12-07 11h39m27s GPS.pos

7.7 Processing survey data

7.7.1 Setting the result output folder

To set the result output folder, select **Tools | Processing Options** from the main menu to open the Processing Options dialog (see *Figure 7-18*). Click Browse to find the folder into which the files and reports will be saved. The default folder is "C:\Roughometer\Survey Results".

7.7.2 Setting Roughness and Distance units

Roughness data can be processed to produce results and graphs in metric or imperial units.

If Metric units are selected, then roughness is expressed in units of metres/kilometre correlating to the International Roughness Index (IRI), or in Roughness Counts/kilometre from a vehicle based Response Type Road Roughness Measuring System (RTRRMS). In Australia, these RTRRMS counts are known as NAASRA counts. For both units, the rougher the road, the higher the roughness result. The Roughometer II processing software can produce result tables and graphs in either IRI or NAASRA counts. Distance is displayed in metres or kilometres depending on the length of the survey.

If Imperial units are selected, then roughness is expressed in units of inches/mile correlating to the International Roughness Index (IRI). Distance is displayed in miles and Roughness is displayed in NAASRA counts/mile.

In the Processing Options dialog, select either **Metric** or **Imperial** from the **Units** combo box.

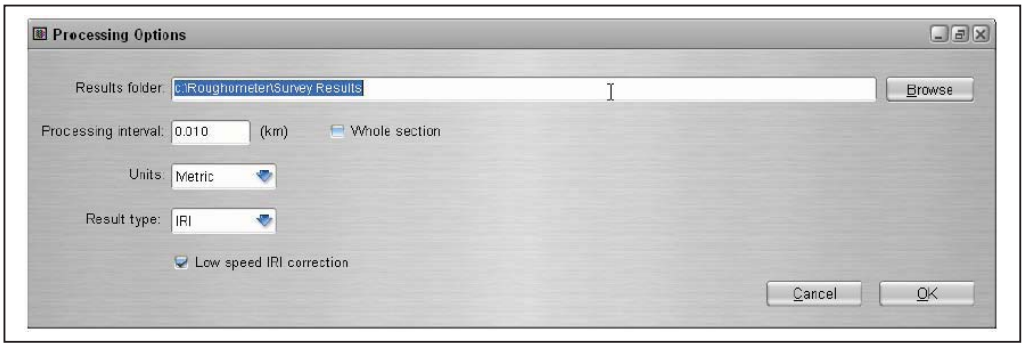


Figure 7-18 : Setting processing options

Click OK to save this option. The selected units will be the default next time the program is launched.

Select the desired Roughness measurement units by choosing either **IRI** or **NAASRA** from the **Result type** combo box.

7.7.3 Selecting the reporting interval

Typically, Roughness of a road section is reported in 100 metre intervals. It may be desirable to vary this reporting interval, for instance to report a more localised feature (shorter reporting interval) or to get an overall roughness number for a whole road section.

In the Processing Options dialog (see *Figure 7-18*), enter a new reporting interval into the **Processing interval** box.

If a single Roughness result is required for each section, then check the **Whole Section** box. Click OK when complete. Survey data can then be reprocessed using this new Reporting Interval.

7.7.4 Low speed IRI correction

While it is desirable to maintain a constant survey speed above 25 km/h, it is inevitable that the driver will occasionally need to slow down to negotiate a corner or allow for traffic conditions. This low speed data can produce unrealistically high IRI results and influence surrounding valid data. By default, the processing program detects the low speed data and compensates to ensure it does not produce peaks in the IRI results.

During the survey, the operator should enter an Event to signify where the slow-down occurred. In examining the report, IRI results around the event of low speed should be treated with caution and most likely, disregarded.

In the Processing Options dialog (see *Figure 7-18*), toggle the automatic Low Speed IRI Correction on/off by checking/unchecking the **Low Speed IRI Correction** box. The default setting is Low Speed IRI Correction on.

7.7.5 The assessment criteria

To assist in the quick assessment of a road survey, a report is available which sorts the Roughness results into a number of categories or 'bins'. The table below (*Figure 7-19*) shows the Roughness Categories and their corresponding IRI and NAASRA ranges.

Roughness Category	IRI (Metric)	IRI (Imperial)	NAASRA (Metric)
Very Good	0 – 2	0 – 157	0 – 66
Good	3 – 4	158 – 284	67 – 119
Fair	5 – 6	285 – 411	120 – 171
Poor	7 – 8	412 – 664	172 – 277
Bad	11 +	665 +	278 +

Figure 7-19 : Roughness Categories vs IRI and NAASRA

The criteria will vary from user to user. A logging track carrying low speed trucks through a state forest would be assessed as fair with a roughness of, say 6, but an unsealed road in a rural shire carrying relatively high volumes of traffic at speeds of around 80 km/h would regard the same road as poor or bad.

The criteria can be varied to suit the location and road type. Note that the actual IRI values calculated will not vary, only the assessment 'bins' into which they are sorted.

These criteria are used in the generation of the Road Condition Assessment report (see *Paragraph 7.8.1*) and the survey route map (see *Paragraph 7.8.5*).

To edit the Assessment Criteria, select **Tools | Assessment Criteria** from the main menu and enter the desired upper limits for each category. Click OK to close the dialog.

Figure 7-20 : Assessment criteria

7.7.6 Processing

After all necessary processing options have been set, click Process on the toolbar or select **File | Process** from the menu. Navigate to the desired folder (the default is "C:\Roughometer\Survey Data") then select the survey to be processed (see *Figure 7-21*).

Select the required file and click Open to start processing.

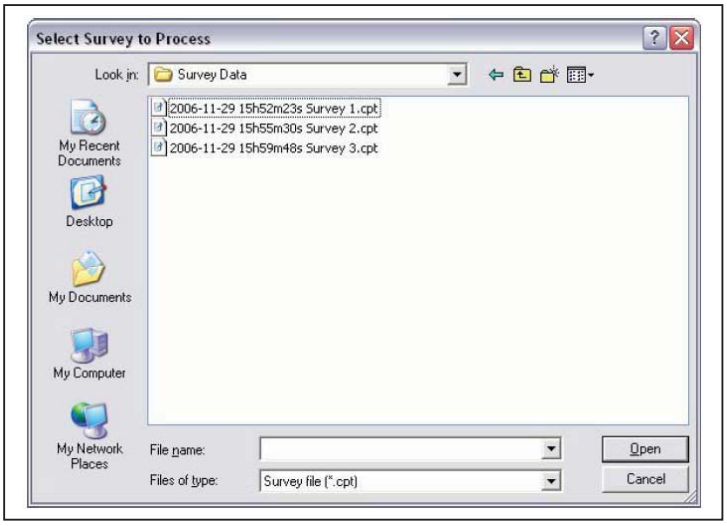


Figure 7-21 : Data file selection

A Report Header dialog will open, into which details of the survey can be entered (see *Figure 7-22*). Press Tab or use the mouse to move between fields. Click OK when the desired report header details have been inserted. Data processing will commence, with progress being displayed on the progress bar along the bottom of the screen.

Figure 7-22 : Enter Header Information

Note: Filling in the Report Header fields is optional. Processing will continue if OK or Cancel is pressed to bypass this step. The Report Header information can be entered at any time during or after processing.

7.8 Reports

7.8.1 Files and reports generated by processing

Processing generates a number of files and reports that can be viewed and printed directly from the Roughometer II program, or they can be accessed using programs such as Microsoft Word and Excel.

The reports are stored automatically in the folder "C:\SurveyResult". This is the default folder which can be changed by selecting **Tools | Processing Options . . .** (see *Paragraph 7.7.1*).

Roughness reports can be produced in either IRI (metric or imperial) or NAASRA (metric only) format (see *Paragraph 7.7.2*).

The files produced are:

- YYYY-MM-DD HHhNNmEEs Survey P.csv - IRI and NAASRA roughness and vehicle speed data in a comma separated variable (CSV) file suitable for importing into Microsoft Excel. Does not contain any header information.
- YYYY-MM-DD HHhNNmEEs Survey P.rst - Complete IRI results file including header information and file folder information. **Note:** this file is not formatted for readability.
- YYYY-MM-DD HHhNNmEEs Survey P IRI.rtf - Formatted IRI results file. Includes all header, section and events information. The file is in rich text format (RTF) suitable for text editing programs such as Microsoft Word.
- YYYY-MM-DD HHhNNmEEs Survey P NAASRA.rtf - Formatted NAASRA roughness counts (NRC). Includes all header, section and events Information. The file is in rich text format (RTF) suitable for text editing programs such as Microsoft Word.
- YYYY-MM-DD HHhNNmEEs Survey P Road Condition.rtf - Assessment file containing IRI results sorted into 'Assessment Bins' (see *Paragraph 7.7.4* for details of the assessment criteria used). The file is in rich text format (RTF) suitable for text editing programs such as Microsoft Word.
- YYYY-MM-DD HHhNNmEEs Survey P GPS.csv - IRI and NAASRA roughness, vehicle speed and GPS position fix data in a comma separated variable (CSV) file suitable for importing into Microsoft Excel. Does not contain any header information.

The format of the file names is the same as described in *Section 7.6.3*.

The reports produced are:

- Roughess Report
- Road Condition Assessment Report
- Graph of Roughness vs Distance
- Map of the survey route showing road condition assessment (available only if the GPS option is being used)

These reports can be viewed and printed directly from the Roughometer II program. The report displayed on the main screen is selected by clicking the relevant tab in the bottom left corner of the screen. *Figure 7-27* shows the Roughness Graph view.

7.8.2 Condition Assessment Report

The Condition Assessment view (see *Figure 7-23*) is a table showing roughness levels according to the set Assessment Criteria levels (see *Paragraph 7.7.5*).

Full header details are shown at the top of the report.

The fields in the table are:

- **SecID** - the section number of the record
- **SubDist** – cumulative distance within the section (in the selected units)
- **TotDist** – cumulative distance of the survey (in the selected units)
- **Excell – Good – Fair – Poor - Bad** – the condition assessment is marked with an X. The assessment criteria are set as shown in *Section 7.7.5*.

At the base of the table is the **Average Value** of the condition assessment of the full survey (see *Figure 7-24*).

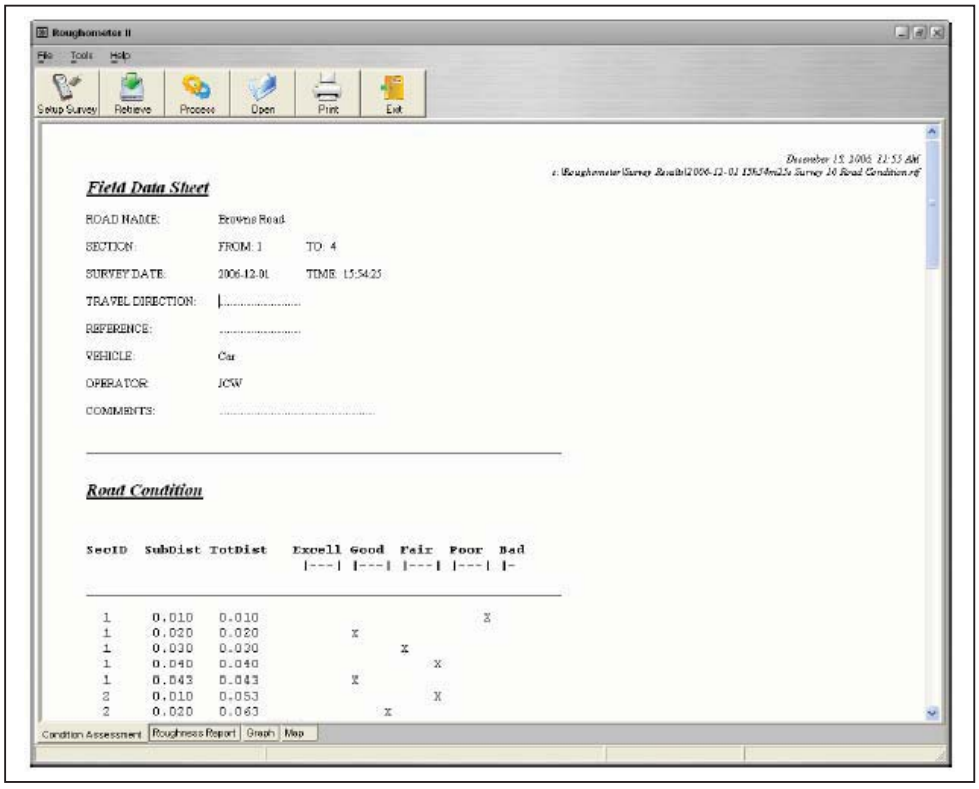


Figure 7-23: Condition Assessment report view

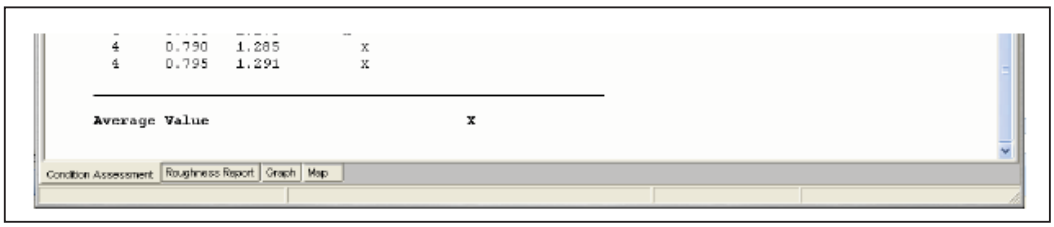


Figure 7-24: Average Condition Assessment for whole survey

7.8.3 Roughness Report

The Roughness Report view (see *Figure 7-25*) is a table showing the calculated roughness levels in the selected units.

Full header details are shown at the top of the report.

The fields in the table are:

- **SecID** - the section number of the record
- **SubDist** – cumulative distance within the section (in the selected units)
- **TotDist** – cumulative distance of the survey (in the selected units)
- **IRI** or **NAASRA** – the roughness (in the selected units)
- **Speed** is the vehicle speed at that point (in the selected units)
- **Event** shows the events that were marked during the survey.

At the base of the table is the **Average Value** of the roughness for the full survey (see *Figure 7-26*).

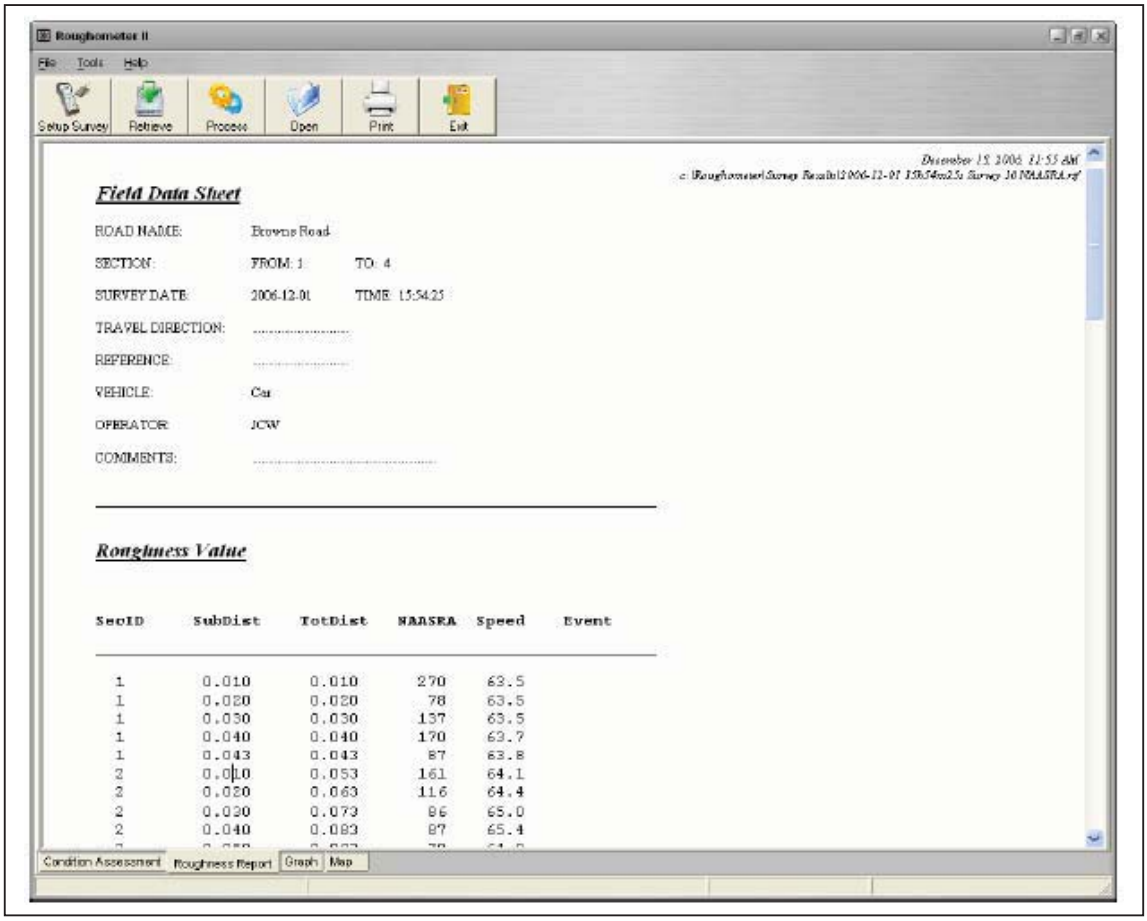


Figure 7-25: Roughness Report view

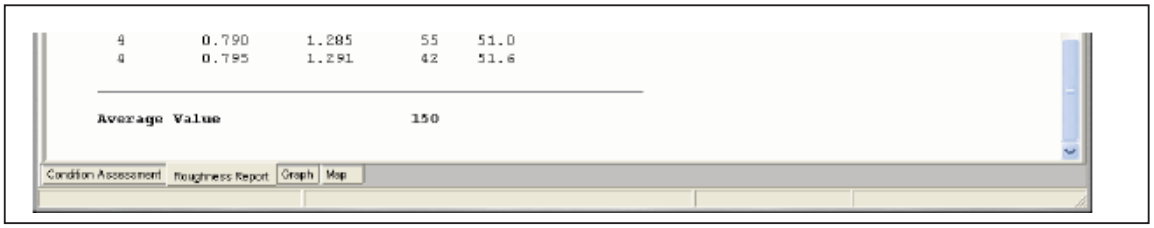


Figure 7-26: Average Roughness value for whole survey

7.8.4 Roughness Graph

Graph view is shown in *Figure 7-27*, together with its right click menu which provides extra options for customising the view.

Graph view is a plot of Roughness (IRI or NAASRA, as selected) versus Distance. Event tags, Section points, and Condition Assessment levels are also shown.

The graph can be zoomed in by left clicking and dragging down and left to create a box. The zoomed view is rescaled appropriately. To return to the original view, click Restore chart in the top right corner (only available when the view has been panned or zoomed).

The graph can be panned by right clicking and dragging the mouse in any direction. Axis scaling is automatically adjusted as appropriate. To return to the original view, click Restore chart in the top right corner (only available when the view has been panned or zoomed).

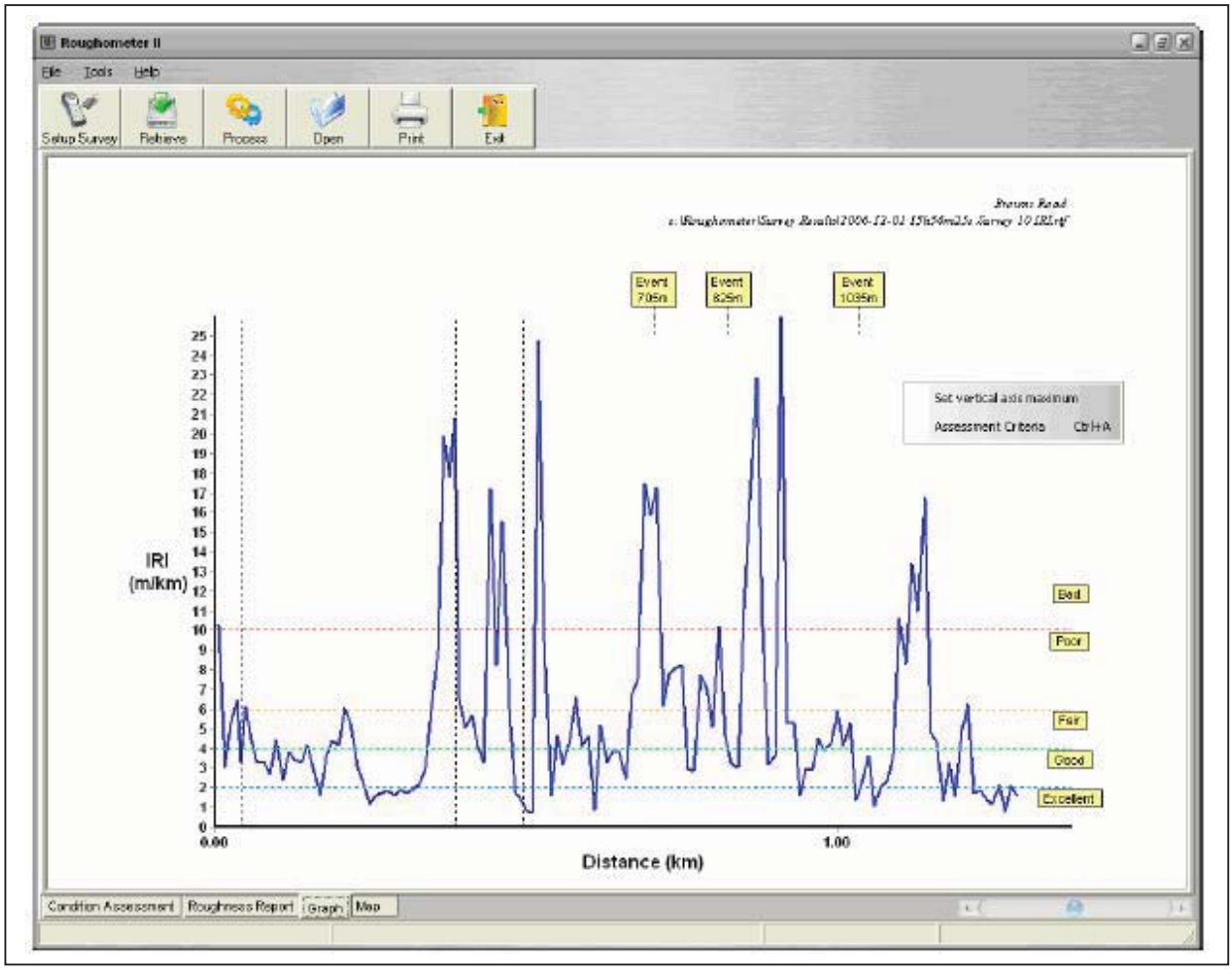


Figure 7-27: Roughness Graph view

To access the right click menu, position the mouse over the view and click the right button. The functions provided are:

- **Set vertical axis maximum** opens the dialog of *Figure 7-28* and allows customising of the vertical axis of the graph. Enter any number for the maximum and click OK.

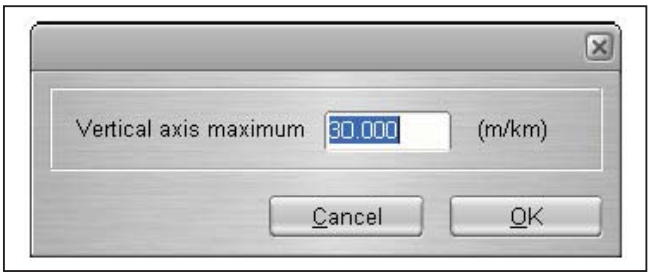


Figure 7-28: Setting the graph vertical axis maximum

- **Assessment criteria** allows the assessment criteria to be customised (see *Paragraph 7.7.5*).

The graph may be split to cover a number of pages. In the case where a long survey has been performed, it may be useful to expand the graph to display smaller sections in more detail.

Select **Tools | Application Options** from the main menu to open the dialog of *Figure 7-29*. Select a number of pages for the graph and click OK . The graph will be redrawn and the first page will be displayed.

Figure 7-29 : Selecting the IRI graph option

To view other pages, use the slider control in the bottom right corner of the dialog (see *Figure 7-30*).

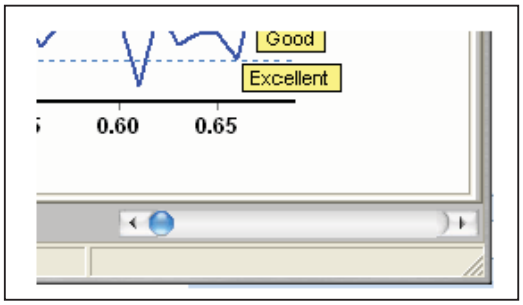


Figure 7-30: Viewing multiple page graphs

7.8.5 Survey Map

Map view, which is available only if the GPS option has been used, is shown in *Figure 7-31*, together with its right click menu which provides extra options for customising the view.

The map can be zoomed in by left clicking and dragging down and left to create a box. The zoomed view is rescaled appropriately. To return to the original view, click Restore chart in the top right corner (only available when the view has been panned or zoomed).

The map can be panned by right clicking and dragging the mouse in any direction. To return to the original view, click Restore chart in the top right corner (only available when the view has been panned or zoomed).

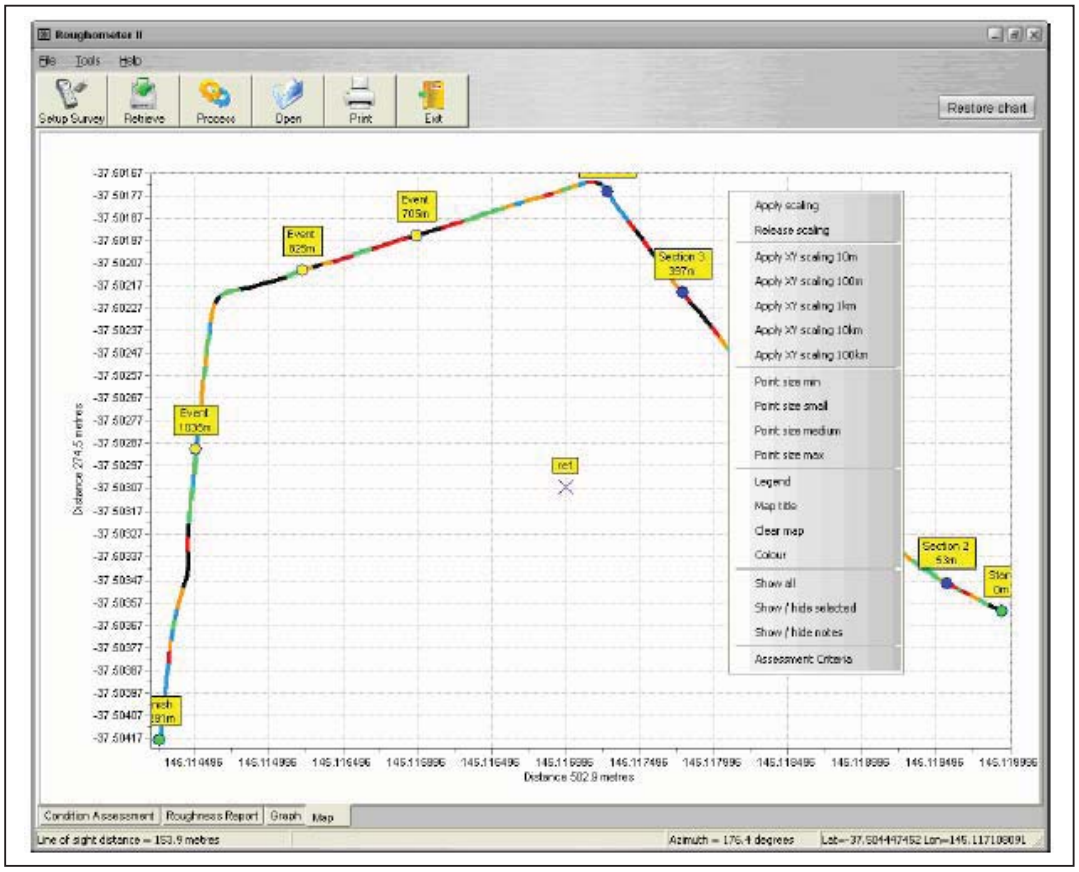


Figure 7-31: Map view

The default map shows the route line colour coded to show the roughness according to the set Assessment Criteria (see *Paragraph 7.7.5*), the Start and End points, the marked Events and the Section start points

To access the right click menu, position the mouse over the view and click the right button. The functions provided are:

- When the map is first drawn after opening the survey file, the vertical and horizontal scales are such that the map occupies close to all of the map area in both directions. Selecting **Apply scaling** applies the larger of the two axis scales to both axes.
- **Release scaling** returns the map to the original, unequal scales.
- **Apply XY scaling** applies one of five scales to both vertical and horizontal axes (the same scale to both). Before selecting one of the five scales, you must double click on a point in the map to set that point as the reference. The XY scaled map will be centred around the reference point.
- In metric units, the five scales are **10m**, **100m**, **1km**, **10km** and **100km**.
- In imperial units, the five scales are **10ft**, **100ft**, **1 mile**, **10 mile** and **100 mile**.
- Each section change, each event, and the start and end points are marked by a coloured dot or point. The **Point size** can be selected to be **min**imum, **small**, **medium** or **max**imum. Note that the event points and the start and end points change together and the section points change together (see **Show / hide selected** below).
- **Legend** enables a legend to be added to the map at the bottom.
- **Map title** enables a title to be added to the map at the top.
- **Clear map** clears the map area.

- **Colour** – The colour of a "series" (see **Show / hide selected** below) can be changed by clicking on the series and then selecting **Colour**.
- **Show all**
- **Show / hide selected** – There are three "series" on a map. They are the line of the route, the event and start and end points, and the section points. Click on one of the "series" to select it and then hide or show, as required.
- **Show / hide notes** – Notes can be added that show the IRI in the selected units at each calculation point along the route. NAASRA figures cannot be shown.
- **Assessment criteria** allows the assessment criteria to be customised (see *Paragraph 7.7.5*).

Measuring distances and direction

To measure distance and direction on the map, double click the map to select a reference point. The line of sight distance and direction of the cursor to the reference point is report on the bottom line of the view (see *Figure 7-32*). The map may be rescaled, panned or zoomed, as required, without affecting the distance and direction display.

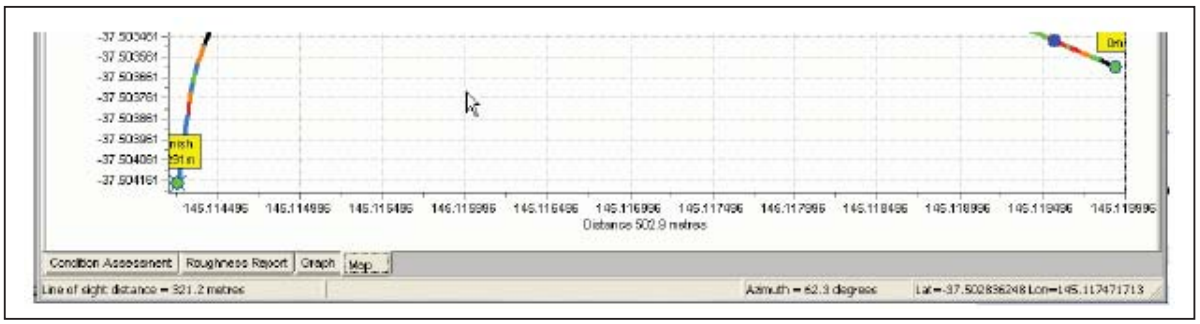


Figure 7-32: Measuring distance and direction on the survey map

7.8.6 Opening an existing report

Reports created during a previous processing session can be opened for viewing, printing and editing. Click Open on the toolbar or select **File | Open** from the menu. Navigate to the required folder and double click to select the report file (see *Figure 7-33*).

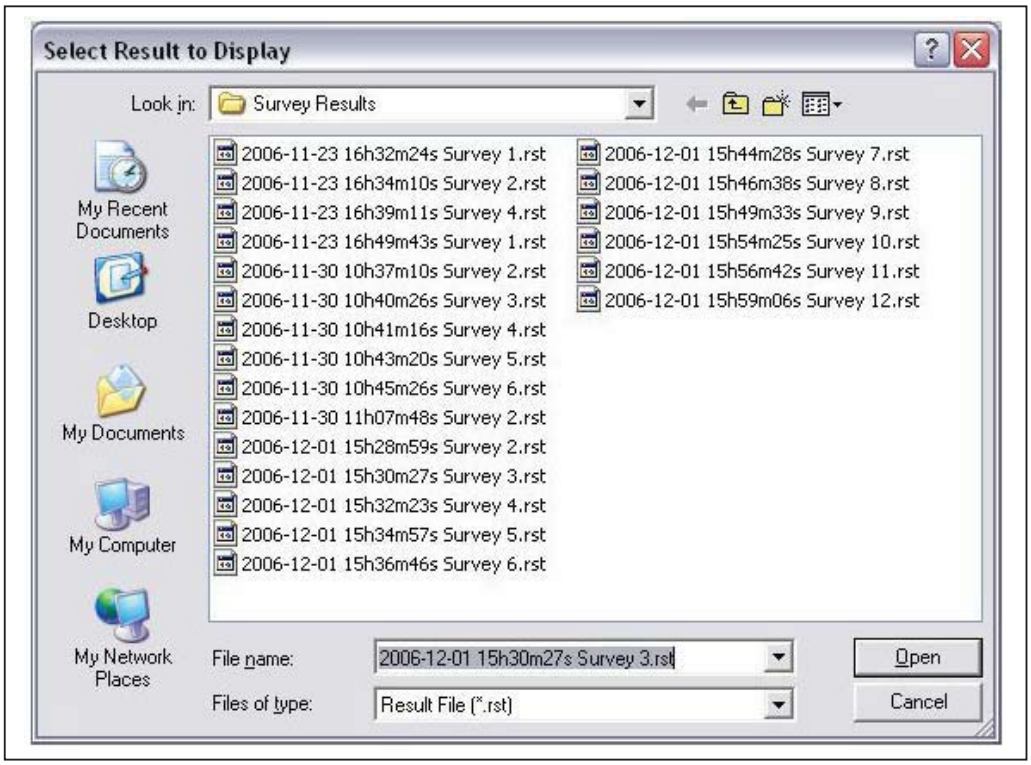


Figure 7-33 : Opening an existing report

7.8.7 Editing event information

The events displayed in an open report file can be edited to provide more information about the event. For example, an event may be a rail crossing, a cattle grid or slow down for traffic. This information cannot be entered into the controller during the survey, but must be noted and edited into the report at processing time.

To edit the events, select **Tools | Edit Events** in the main screen to open the Events Editor dialog (see *Figure 7-34*).

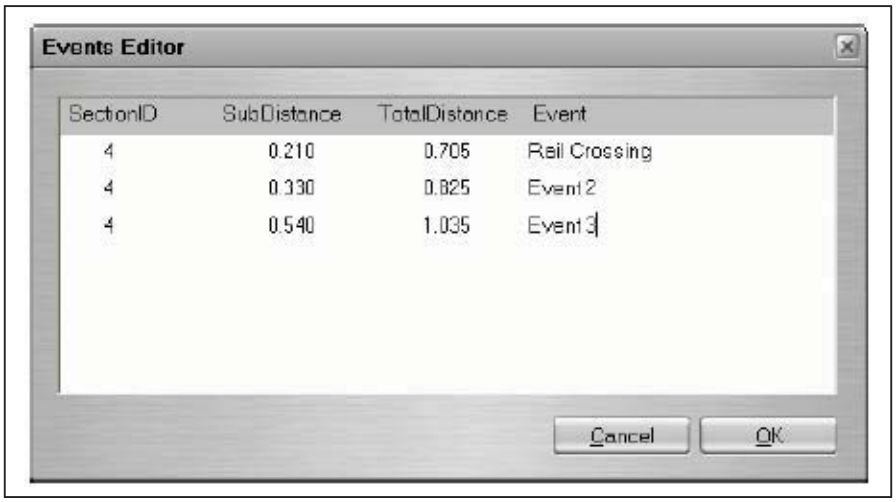


Figure 7-34 : Editing events

The first event will be highlighted. Type a description of the event (such as Railway). Tab to each of the other events and type a description. Click on OK to complete the editing. The event description will be updated in the reports.

Event labels can also be edited by clicking on the event in Graph and Map views.

7.8.8 Editing header information

Header information such as Road Name, Travel Direction and Operator Name is typically entered before processing, but can also be edited during or after processing.

To edit the header Information, select **Tools | Edit Header** from the main screen to open the Report Header dialog (see *Figure 7-35*).

Figure 7-35 : Editing Header Information

Tab to the fields to be edited (or click in the fields) and enter the new information. Click on OK to complete editing. The header Information will be updated in the reports.

7.8.9 Printing reports

The **Print** button on the toolbar will print only the page currently on the screen.

SECTION-3
(Customized Software)

RSDMS-V

Introduction

এলজিইডির আওতায় বিভিন্ন সড়ক-শ্রেণীর প্রায় ৭৯৭৫০ টি সড়ক নেটওয়ার্ক রয়েছে যার মোট দৈর্ঘ্য প্রায় ২৫০০০০ কিমি । তন্মধ্যে প্রায় ৪২৫০ টি উপজেলা সড়ক, ৭৫০০ টি ইউনিয়ন সড়ক এবং ৬৮০০০ টি গ্রাম সড়ক । এছাড়া এসকল সড়কের উপর প্রায় ১৬৫০০০ টি ব্রীজ/কালভার্ট রয়েছে । এই বিপুল সংখ্যক সড়ক ও ব্রীজ/কালভার্ট এর বিভিন্ন ধরনের তথ্য সংরক্ষণ এবং এই তথ্য-উপাত্তসমূহ বিশ্লেষন করে নির্মান ও রক্ষণাবেক্ষণ সংক্রান্ত প্রশাসনিক সিদ্ধান্ত গ্রহনে সহায়তা করার লক্ষ্যে Road & Structure Database Management System (RSDMS) Software-টি তৈরি করা হয় । পরবর্তীতে Management ও ব্যবহারকারীদের চাহিদা অনুযায়ী ধাপে ধাপে বিভিন্ন Feature সংযোজন করে Software-টির Updating প্রক্রিয়া চলতে থাকে । বর্তমানে এর RSDMS-V Version-টি প্রচলিত আছে ।

Software-টির মাধ্যমে সড়ক সমূহের সাধারণ তথ্যসমূহের (নাম, দৈর্ঘ্য, ইত্যাদি) পাশাপাশি Surface Type break-up, Traffic Information, Visual Road Condition, Construction History, Maintenance Plan, Maintenance History, Union-wise break-up, Connectivity with Growth Center/Rural Market/Important Social Infrastructure, ইত্যাদি তথ্য সংরক্ষণ করা হয়ে থাকে । একইভাবে ব্রীজ/কালভার্ট সমূহের বিভিন্ন তথ্য (Location, Span, ইত্যাদি) সংরক্ষণের পাশাপাশি Damage Component, Maintenance Plan, Maintenance History, ইত্যাদি তথ্যও সংরক্ষণ করা হয়ে থাকে ।

এছাড়া এলজিইডির বার্ষিক সড়ক ও ব্রীজ/কালভার্ট রক্ষণাবেক্ষণ কর্মসূচীর আওতায় যে বিপুল সংখ্যক স্কীম বাস্তবায়নের কাজ হয়ে থাকে সেই স্কীমসমূহের যাবতীয় তথ্য এবং তাদের Physical/Financial Progress সম্পর্কৃত তথ্য এই Software-এর মাধ্যমে সংরক্ষণ করা হয়ে থাকে ।

সড়ক সমূহের Surface Type/Condition, ব্রীজ/কালভার্ট সমূহের Condition যেহেতু প্রতিনিয়তই পরিবর্তনশীল তাছাড়া প্রতিবছরের নির্মান ও রক্ষণাবেক্ষণ কর্মসূচীর History যেহেতু এই Software-এর মাধ্যমে সংরক্ষণ করা হয়ে থাকে, তাই Database-টি Update-করণ একটি চলমান প্রক্রিয়া । উপজেলা অফিস থেকে সকল তথ্য সংগ্রহের নিমিত্তে Database-টিকে Design করা হয়েছে । যার ফলে হালনাগাদকরণ সংক্রান্ত সকল কার্যক্রম সংশ্লিষ্ট উপজেলা অফিসে সম্পন্ন হওয়ার পর পর্যায়ক্রমে তা জেলা অফিসের মাধ্যমে সদর দপ্তরে সন্নিবেশ করা হয়ে থাকে ।

Technical Specification

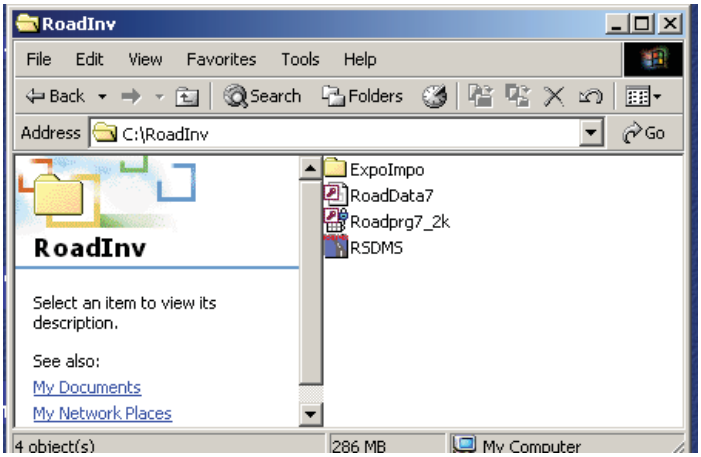
RSDMS Software টি Microsoft Access Database এবং Visual Basic for Application এর সমন্বয়ে তৈরি করা হয়েছে । Software টিতে তথ্য/উপাত্তসমুহ সংরক্ষণের জন্য ১টি Database File (RoadData7.MDB) এবং উক্ত Database File টিকে Link করে কার্য সম্পাদনের জন্য ১টি আলাদা Interface (RoadPrg7.MDE) তৈরি করা হয়েছে । যার ফলে Software টি Client-Server environment এ ব্যবহার করা সম্ভব । Software ব্যবহার করার জন্য নিম্নলিখিত Software/ Hardware environment প্রয়োজন ঃ

- Software environment:
  Operating System (OS): Windows family
  (Windows 95/98, Windows NT, Windows 2000/ XP)

  Application Software : MS Access 2000

- Hardware environment:
  CPU : Pentium-I or above
  RAM : 64 MB or above (depending on OS)

RSDMS Software এ ব্যবহৃত File-গুলি C Drive এ RoadInv নামক Folder এর ভেতর থাকতে হবে । অন্যথায় Software টি Run করবে না ।



সরবরাহকৃত CD-টিতে RoadInv নামে ১টি Folder দেখতে পাবেন

- Folder-টি copy করুন এবং C Drive-এ Paste করুন ।
- এবার Folder-টির ভিতরের সবকটি File Select করে Mouse এর Right button চেপে Properties এ যান এবং Attributes: Read Only এর Tick তুলে দিয়ে Archive এ Tick দিন ।
- এবার RoadPrg7.MDE File-টি Double Click করে Program -টি Run করুন ।

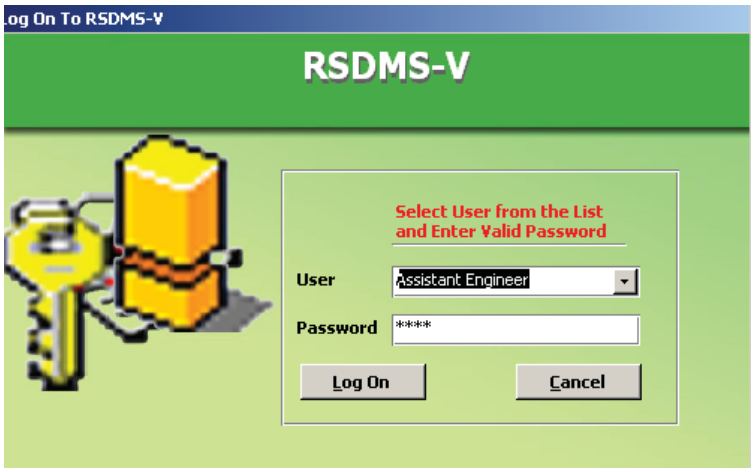
▶▶ প্রয়োজনে নিম্নলিখিত পদ্ধতিতে Desktop-এ Software-টির Short-cut তৈরি করা যেতে পারে যেখান থেকে সহজেই Software-টি Run করা যাবে ।

- **RoadPrg7.MDE** File-টিতে Mouse এর Right Button Click করুন ।
- এবার **Send To >> Desktop** (create shortcut) Icon-টিতে Click করুন ।
- দেখা যাবে Desktop-এ Software-টির Short-cut তৈরি হয়ে গেছে ।

Note : RSDMS Software এ ব্যবহৃত File-গুলি C Drive এ RoadInv নামক Folder এর ভেতর থাকতে হবে । অন্যথায় Software টি Run করবে না ।

C Drive এর RoadInv নামক Folder টির মধ্যে অবস্থিত RoadPrg7.MDE File-টি Double Click করে Program -টি Run করতে হবে।

Program -টি Run করার পর ১টি Log-on Screen পাওয়া যাবে। উক্ত Screen-টি থেকে প্রযোজ্য User select করতে হবে এবং যথাযথ Password type করতে হবে। অতঃপর **Log On** Button-টি Click করে Software-টিতে Log On করা যাবে। Log-on Screen -টি নিম্নরুপঃ



Note : Software-টি বিতরণকালীন সময়ে User-এর বিপরীতে কোন Password দেয়া থাকবেনা। অর্থাৎ শুধুমাত্র User select করে Software-টিতে Log On করা যাবে।

Switch-Board, Menu Bar এবং Common Command Button এর ব্যবহার পদ্ধতি

Overview

- Switch Board এর কার্যকারিতা
- Menu Bar এর কার্যকারিতা
- Command Button এর কার্যকারিতা
- Hot Key এবং তার ব্যবহারিতা

Software টির সকল কার্যক্রম Switch-Board, Menu Bar এবং কিছু Command Button এর মাধ্যমে পরিচালিত হয় । কাজেই Software টি পরিচালনা করতে হলে উপরোক্ত বিষয়ের ব্যবহার পদ্ধতি জানা আবশ্যক । এই Module এ আমরা Switch-Board, Menu Bar এবং সচরাচর ব্যবহৃত Command Button নিয়ে আলোচনা করবো ।

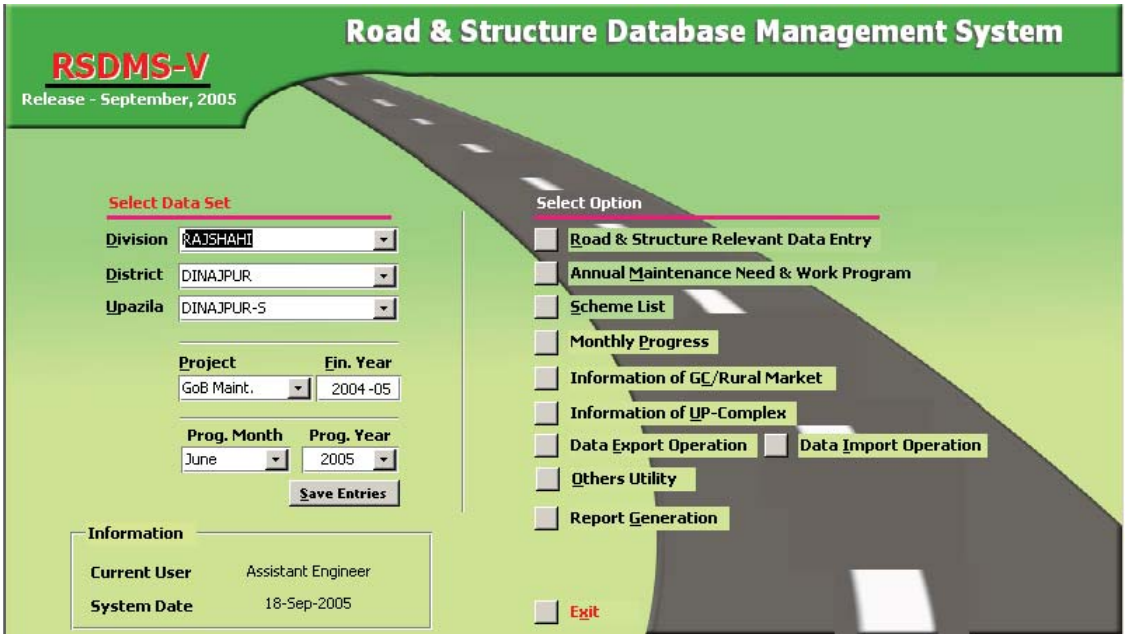
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Switch-Board এর কোন Button চেপে কোন ধরনের কাজ করা যায় ।
- Menu Bar এর কোন Menu Select করে কোন ধরনের কাজ করা যায় ।
- কোন Command Button কখন ব্যবহার করতে হয় ।

এবং

- Hot Key বলতে কি বুঝায় এবং তা ব্যবহার করে কিভাবে কাজ দ্রুততর করা যায় ।

■ Switchboard:



উপরের ছবিতে আমরা Software টির Switch Board এর ছবি দেখতে পাচ্ছি । Software টি Run করলে প্রথমেই উক্ত Switch Board-টি আসবে এবং Software টির সকল কার্যক্রম উক্ত Switch Board এর মাধ্যমে পরিচালিত হয়ে থাকে ।

⊡ Date Set Selection:

Switch Board এর বামদিকে **Date Set Selection** এর Option দেখা যাচ্ছে । এই Selection এর মাধ্যমে কোন নির্দিষ্ট উপজেলার Road & Structure Inventory তৈরিসহ অন্যান্য কার্যক্রম পরিচালনা করা যাবে ।

প্রার্থিত উপজেলা Selection এর জন্য প্রথমে Division List থেকে নির্দিষ্ট Division Select করতে হবে । এখন শুধুমাত্র Select কৃত Division এর District সমূহ District List এ দেখা যাবে। এখন District List থেকে নির্দিষ্ট District Select করতে হবে। এখন শুধুমাত্র Select কৃত District এর Upazila সমূহ Upazila List এ দেখা যাবে। এখন Upazila List থেকে প্রার্থিত Upazila Select করতে হবে ।

Scheme List তৈরি/সম্পাদন করতে হলে Project, Financial Year Select করতে হবে। Scheme -এর Progress তৈরি/সম্পাদন করতে হলে Progress Year & Month Select করতে হবে।

Save Entries button-টি Click করে উক্ত Selection Save করে রাখা যাবে ।

⊡ Select Option:

- **Road & Structure Relevant Data Entry**

  সড়ক ও ব্রীজ/কালভার্ট এর বিভিন্ন ধরনের তথ্য সংরক্ষণ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Annual Maintenance Need & Work Program**

  সকল প্রকার রক্ষণাবেক্ষণের চাহিদা নিরুপন/ Work Program তৈরি সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Scheme List**

  সকল স্কীম তৈরি/ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Monthly Progress**

  স্কীম সমূহের Physical/Financial অগ্রগতির তথ্য সংরক্ষণ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Information of GC/Rural Market**

  Growth Center/Rural Market এর তথ্য সংরক্ষণ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Information of UP-Complex**

  Union ও Union Parishad Complex এর তথ্য সংরক্ষণ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Data Import Operation**

  Data Import করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Data Export Operation**

  Data Export করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Report Generation**

  বিভিন্ন ধরনের Report দেখার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Exit**

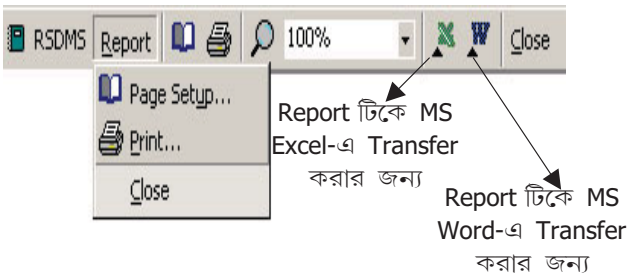
  উক্ত Button-টি ব্যবহার করে RSDMS Program থেকে বের হওয়া যাবে ।

■ Menu Bar:

⏩ Main Menu :

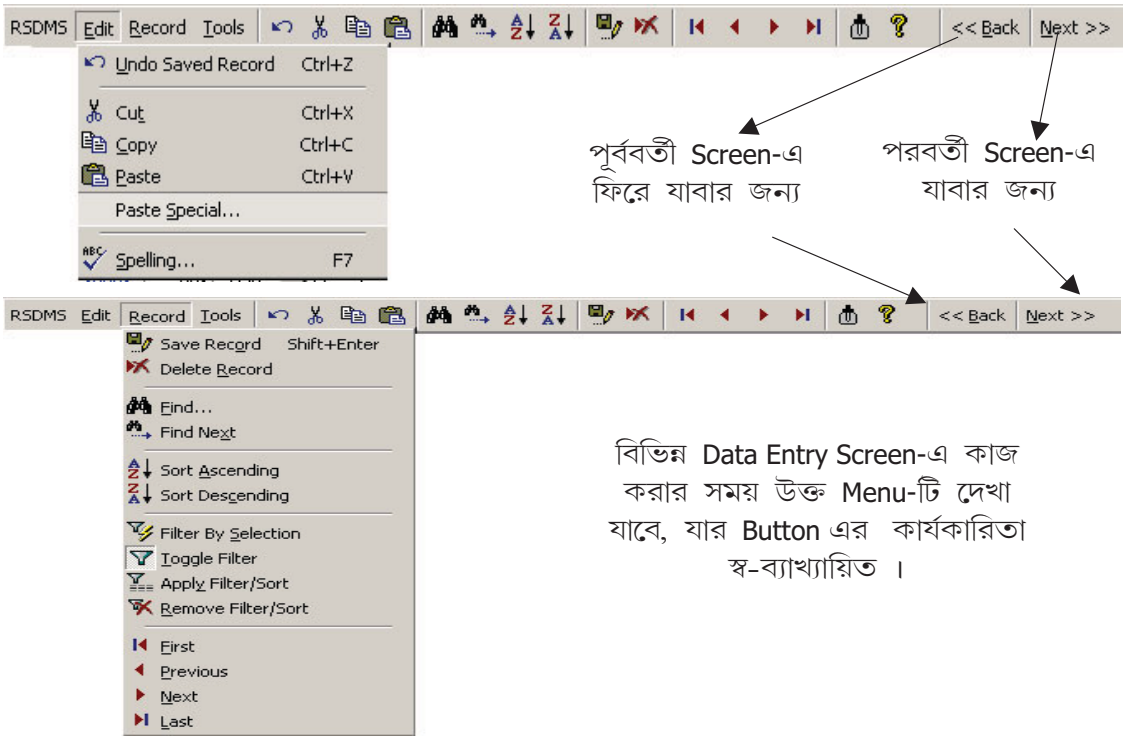
বাম পাশের ছবির Menu-টি Main Menu । Switch Board এর সকল Button এর কার্যক্রম এই Menu থেকেই পরিচালনা করা যায় উপরোক্ত « **Fund Source List** » ও « **Fund Allocation** » এখান থেকে দেখা যায় এবং প্রয়োজনে সেই Data Add/Edit করা যায় ।

⏩ Report Menu :



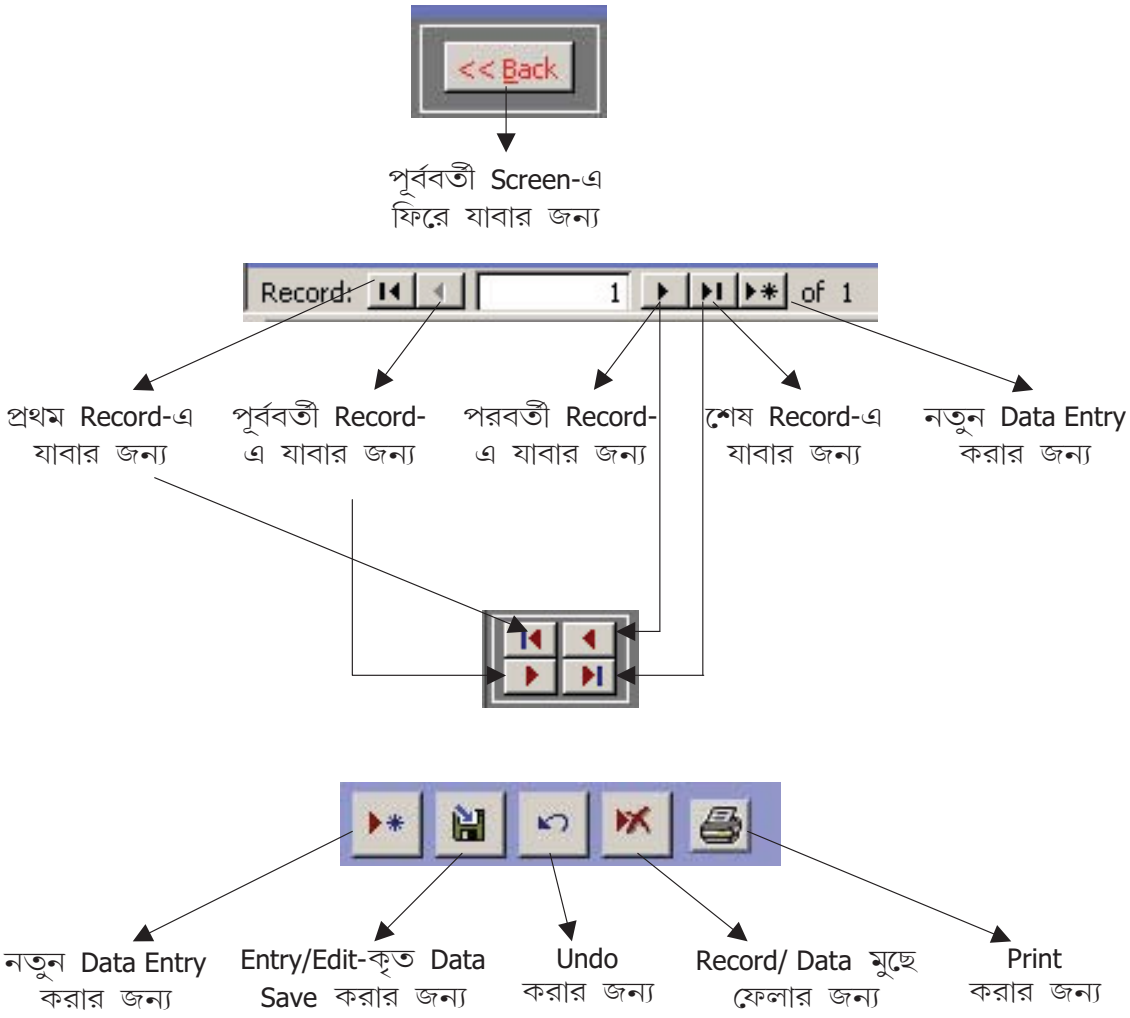
যে কোন Report Preview এর সময় উক্ত Menu-টি দেখা যাবে, যার Button এর কার্যকারিতা স্ব-ব্যাখ্যায়িত।

⏩ Data Add/Edit সংক্রান্ত Menu :



বিভিন্ন Data Entry Screen-এ কাজ করার সময় উক্ত Menu-টি দেখা যাবে, যার Button এর কার্যকারিতা স্ব-ব্যাখ্যায়িত ।

■ Common Command Button এর ব্যবহার ঃ



■ Hot Key এবং তার ব্যবহারিতা ঃ

MS Windows এবং তার Environment-এ ব্যবহৃত বিভিন্ন Application Software-এর অধিকাংশ Menu/Sub Menu/ Button এর Caption এর কোন একটি অক্ষরের নিচে Underline করা থাকে (যেমন ঃ File Menu-এর ক্ষেত্রে F) । Mouse-এর ব্যবহার না করে ALT+ সেই অক্ষর ব্যবহার করে (যেমন ঃ **File Menu**-এর ক্ষেত্রে **ALT+F**) Keyboard সাহায্যে Data Entry সংক্রান্ত কাজ দ্রুততর করা যায় । একেই Hot Key বলে ।

RSDMS Software-এর অধিকাংশ Menu/Sub Menu/ Button এ Hot Key সংযোজন করা হয়েছে যেমন ঃ উপরোক্ত "**Back**" button-এর ক্ষেত্রে **B** (অর্থাৎ **ALT+B**), Switch Board-এর "**Scheme List**" button-এর ক্ষেত্রে **S** (অর্থাৎ **ALT+S**) । একইভাবে অন্যান্য ক্ষেত্রেও এই পদ্ধতি ব্যবহার করে আমরা Data Entry সংক্রান্ত কাজ দ্রুততর করতে পারি ।

সড়ক সংক্রান্ত বিভিন্ন তথ্য **Input/Edit/Update** করার পদ্ধতি

Overview

- Road Code এর Format
- সড়ক সংযোজন/সংশোধন
- সড়কের Traffic Information, AADT
- সড়কের Surface Type break-up, Visual Road Condition, Union-wise break-up Input করার পদ্ধতি
- সড়কের সাথে Growth Center/Rural Market/ Important Social Infrastructure Connectivity Input করার পদ্ধতি
- সড়কের Construction History, Maintenance History Input করার পদ্ধতি
- সড়কের Roughness, DCP, Deflection data Input করার পদ্ধতি
- সড়কের Condition, Pavement Information, Maintenance Histiry সহ Line Diagram Print করার পদ্ধতি

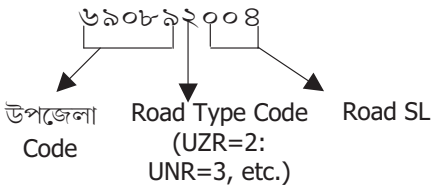
এই Module-এ RSDMS Software এর মাধ্যমে সড়কের বিভিন্ন ধরনের তথ্য Input ও তা হালনাগাদ করার পদ্ধতি নিয়ে আলোচনা করা হবে ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Road Code কোন Format-এ Automatically তৈরি হয় ।
- কিভাবে Road সংযোজন/সংশোধন করা যায় ।
- কিভাবে Road -এর Traffic Information Input করে AADT পাওয়া যায় ।
- কিভাবে Road -এর Surface Type break-up, Visual Road Condition, Union-wise break-up, Connectivity with Growth Center/Rural Market/Important Social Infrastructure, ইত্যাদি তথ্য Input করা যায় ।
- কিভাবে Road -এর Construction History, Maintenance History Input করা যায়।
- কিভাবে Road -এর Roughness, Pavement Thickness, DCP, Deflection data Input করা যায় ।

■ Road Code:

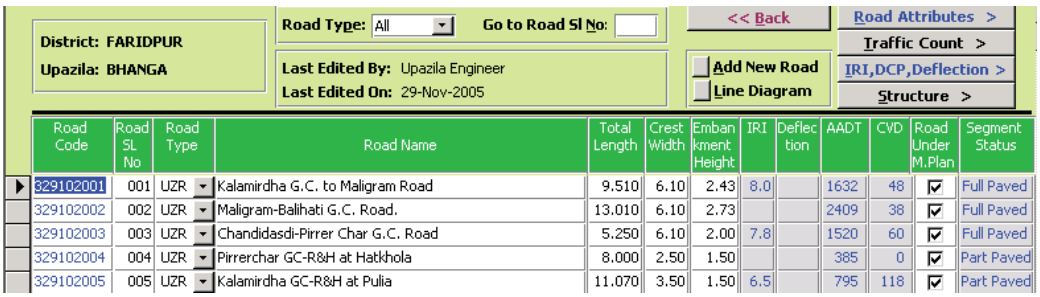
RSDMS Software-এর মাধ্যমে Road Add/ Road Type পরিবর্তন করার সময় প্রতিটি Road-এর জন্য Automatically ১টি Unique Road Code তৈরি হয়ে থাকে, যা নিম্নরূপ ঃ



■ Road সংক্রান্ত Data Entry করার পদ্ধতি ঃ

সড়কের Data Entry অথবা Update করার লক্ষ্যে Switchboard থেকে

- ⏩ প্রথমে নির্দিষ্ট উপজেলা Select করতে হবে ।
- ⏩ অতঃপর **Road & Structure Relevant Data Entry** Button এ Click করলে নীচের Road List Screen-টি দেখা যাবে ।



- ❑ Screen-টির উপরের বামদিকে সংশ্লিষ্ট জেলা, উপজেলার নাম দেখা যাচ্ছে ।
- ❑ List থেকে Road Type Select করে Road Type ওয়ারী Filter করা যাবে ।
- ❑ Go to Road SL No-এর ঘরে Road-এর SL No Input করে {TAB} button Press করলে সরাসরি সেই Road-টিতে চলে যাওয়া যাবে ।
- ❑ নতুন সড়ক অন্তভূক্ত করার জন্য **Add New Road** Button ব্যবহার করতে হবে।
- ❑ সড়কের অন্যান্য তথ্য প্রদানের জন্য **Road Attributes >**, Traffic Data Input করার জন্য **Traffic Count >**, Roughness, DCP, Deflection Data Input করার জন্য **IRI,DCP,Deflection >**, ব্রীজ/কালভার্ট সংক্রান্ত তথ্যের জন্য **Structure >** Button ব্যবহার করতে হবে ।

■ Line Diagram Print করার পদ্ধতি ঃ

Traffic Information, Condition, Pavement Information, Maintenance Histiry ইত্যাদি Data Input করার পর উপরোক্ত Screen থেকে সংশ্লিষ্ট সড়কটি Select করে Screen টির উপরস্থ **Line Diagram** Button-টি Click করলে প্রয়োজনীয় Line Diagram-টি দেখা যাবে এবং Print করা যাবে ।

⏩ নতুন সড়ক অন্তর্ভূক্তিকরণ ঃ

- এজন্য **Add New Road** Button-টি Click করতে হবে, অতঃপর Screen-এর সর্বনিম্নে ১টি Row তৈরি হবে ।
- এখন Road Type Select করতে হবে এবং Road Name, Total Road Length, Crest Width, Embankment Height input করতে হবে ।

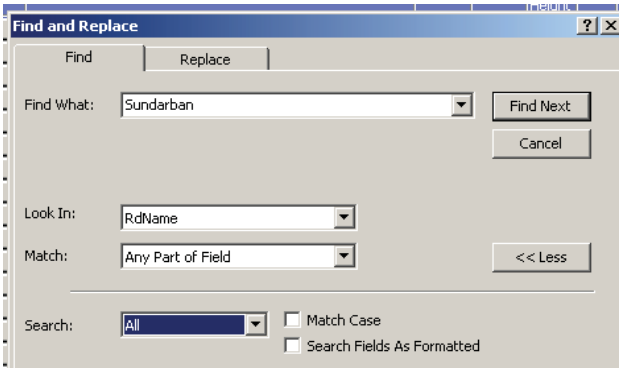
⏩ সড়কের **Road Type** পরিবর্তনকরণ ঃ

- এজন্য **Road Type** List থেকে পরিবর্তিত Road Type-টি Select করতে হবে ।

Note :
- নতুন সড়ক অন্তর্ভূক্তিকরণ কিংবা সড়কের Road Type পরিবর্তনকরণের সময় Automatically Road Code ও Road SL No তৈরি হয়ে থাকে ।
- ক্ষেত্রবিশেষে Road SL No পরিবর্তন করার প্রয়োজন হয়ে থাকে তবে সাধারণতঃ তা না করাই বাঞ্ছনীয় ।

⏩ **Find Road** ঃ

- কোন সড়ক খুঁজে বের করার জন্য **Toolbar** থেকে  Button-টি ব্যবহার করা যেতে পারে । Button-টি Click করলে নিম্নোক্ত Screen-টি দেখা যাবে ।

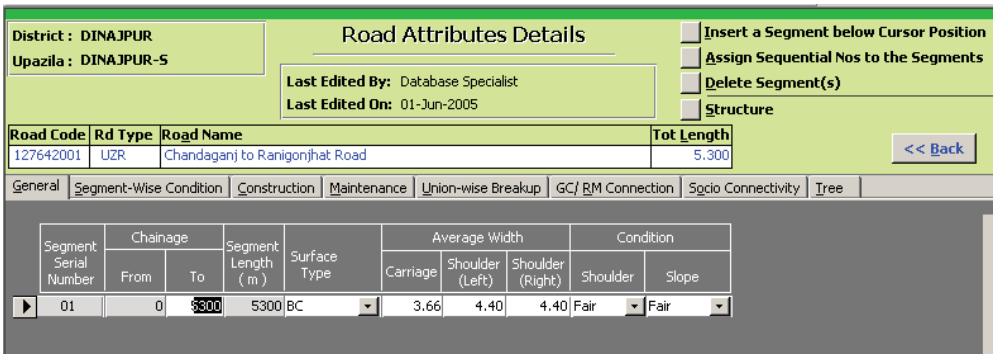


- **Find What** এর ঘরে খুঁজে পেতে ইচ্ছুক সড়কটির আংশিক/সম্পূর্ণ নাম Input করতে হবে ।
- Find What এর ঘরে Input-কৃত text-টি যদি সড়ক নামের প্রথম অংশে থাকার সম্ভাবনা থাকে তবে **Match** List থেকে *Start of Field* Select করতে হবে অথবা যদি সড়ক নামের যে কোন অংশে থাকার সম্ভাবনা থাকে তবে *Any Part of Field* Select করতে হবে ।
- Upper/Lower Case সংক্রান্ত সমস্যা এড়ানোর জন্য *Match Case* Box-এর টিক উঠিয়ে দিতে হবে ।
- **Find Next** Button-টি Click করে ক্রমান্বয়ে খুঁজে বের করা যাবে ।

⏩ Road Attributes Details ঃ

RSDMS Software-এর মাধ্যমে প্রতিটি সড়কের বিপরীতে Surface Type wise break-up, Segment-wise Condition, Construction History, Maintenance History, Union-wise break-up, Connectivity with Growth Center/Rural Market, Connectivity with Important Social Infrastructure, Tree ইত্যাদি তথ্য সংরক্ষণ করা হয়ে থাকে ।

যে সড়কের জন্য উপরোক্ত তথ্য Update/Edit করা হবে Road List Screen থেকে সেই সড়কটি Select করে Screen টির ডানদিকের উপরস্থ **Road Attributes >** Button-টি Click করলে নীচের *Road Attributes Details* Screen টি পাওয়া যাবে ।



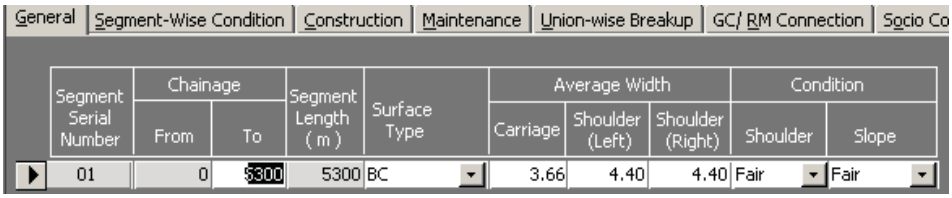
⏩ Screen এর Button সমূহের কার্যকারীতা ঃ

- **Insert a Segment below Cursor Position:** General/Union-wise Breakup Tab Page-এ Segment তৈরির জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Assign Sequential Nos to the Segments:** বিভিন্ন Tab Page-এর Segment সমূহ Chainage অনুযায়ী Sequential Order-এ থাকা প্রয়োজন । অনেকসময় মধ্যবর্তী কোন Segment Delete করার ফলে এই Order Sequentially থাকেনা । উক্ত Button-টি Click করলে Selected Tab Page টির Segment সমূহের Order Automatically Sequential হয়ে যাবে ।
- **Structure:** Button-টি Click করে উক্ত সড়কের Structure-এর তালিকায় যাওয়া যাবে ।

⏩ Tab Page সমূহের সংক্ষিপ্ত বর্ণনা ঃ

Screen-টিতে ৮টি Tab Page আছে। প্রতিটি Tab Page-এ Relevant তথ্য Update/ Edit/Delete করা যাবে । Tab Page-সমূহের কোনটিতে কি ধরনের তথ্য প্রদান করতে হবে তা Tab Page-সমূহের নাম থেকেই বোঝা যায় । তবুও নিম্নে তার সংক্ষিপ্ত বর্ণনা দেওয়া হলো।

- **General** (Surface Type wise break-up)**:**

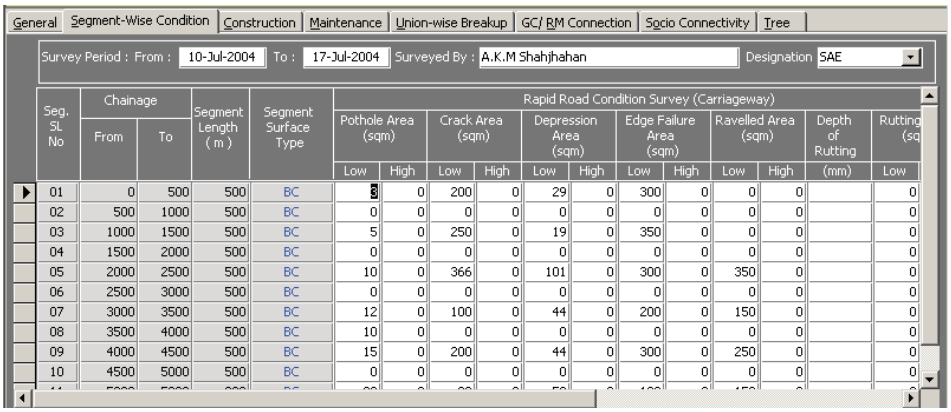


উক্ত Tab Page-এ সড়কের Surface Type (BC/HBB/Earthen ইত্যাদি) অনুযায়ী break-up প্রদান করতে হয় ।

যদি কোন সড়কে একাধিক Surface Type থাকে শুধুমাত্র সেক্ষেত্রেই একাধিক Segment তৈরি করতে হবে এবং Segment গুলির দৈর্ঘ্য (From-To Chainage) উল্লেখ করতে হবে ।

Insert a Segment below Cursor Position Button-টি Click করে এখানে Segment তৈরি করতে হবে ।

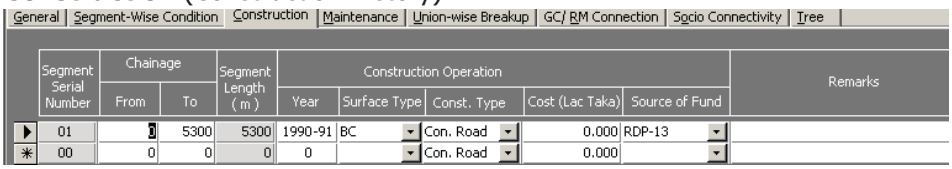
- **Segment-wise Condition** (Visual Road Condition)**:**



উক্ত Tab Page-এ গেলে দেখা যাবে যে Automatically সড়কটির বিপরীতে ৫০০মি করে প্রযোজ্য সংখ্যক Segment তৈরি হয়ে আছে ।

Surveyকৃত Data সংশ্লিষ্ট Segment-এ Input করতে হবে ।

- **Construction** (Construction History)**:**



উক্ত Tab Page-এ সড়কের Construction History Input করতে হবে ।

- **Maintenance** (Maintenance History)**:**

General | Segment-wise Condition | Construction | Maintenance | Union-wise Breakup | GC/ Hat Connection | Socio Connectivity | Tree | Maint. Plan

Segment Serial Number	Chainage From	Chainage To	Segment Length (m)	Last Maintenance Operation: Year	Maint. Type	Cost (Lac Taka)	Source of Fund	Remarks
01	0	11270	11270	2001-02	PM (Other Rd	0.975	GoB Maint.	
02	6270	11270	5000	2001-02	PM (Re-Seal)	7.970	GoB Maint.	
03	0	5100	5100	2002-03	PM (Other Rd	9.190	GoB Maint.	
04	0	11270	11270	2002-03	PM (Re-Seal)	0.517	WFP	

সড়কের Maintenance সংক্রান্ত কাজ সমাপ্ত হওয়ার পর উক্ত Tab Page-এ তা Update করতে হবে ।

- **Union-wise Breakup:**

General | Segment-wise Condition | Construction | Maintenance | Union-wise Breakup | GC/

Segment Serial Number	Chainage From	Chainage To	Segment Length (m)	Name of Union	Union HQ stand at (Chainage)
01	0	5635	5635	Uthrail	
02	5635	11270	5635	Kamolpur	11270

উক্ত Tab Page-এ সড়কের Union ওয়ারী break-up প্রদান করতে হয় ।

Insert a Segment below Cursor Position Button-টি Click করে এখানে Segment তৈরি করতে হবে ।

- **GC/RM Connection** (Connectivity with Growth Center/Rural Market)**:**

General | Segment-Wise Condition | Construction | Maintenance | Union-wise Breakup | GC/ RM Connection

Name of Growth Center/ Rural Market	Type	Situated at (Chainage)
Atoir Hat	Rural Market	2670
RANIGANJ HAT	Growth Center	5300
	-	

উক্ত Tab Page-এ সড়কের উপর অবস্থিত GC/Rural Market সমূহের নাম ও তার অবস্থান (Chainage) Input করতে হবে ।

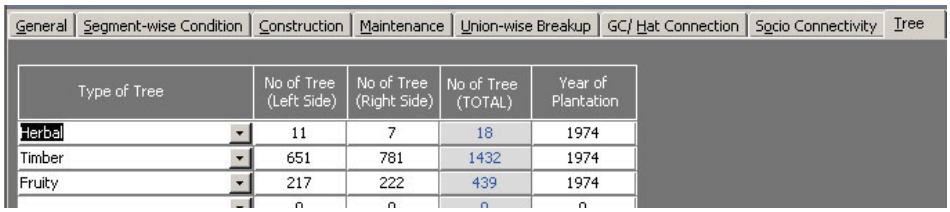
- **Socio Connectivity** (Connectivity with Important Social Infrastructure)**:**

General | Segment-wise Condition | Construction | Maintenance | Union-wise Breakup | GC/ Hat Connection | Socio Connectivity

Social Infrastructure Type	Social Infrastructure Name	Situated at (Chainage)
College	Godagari College	2850
Community Clinic	Maligram Community Clinic	4300
Community Clinic	Janatar mour Community Clinic	8900
Madrasha	Maligram Madrasha	3400
Primary School	Darail GPS	550

উক্ত Tab Page-এ সড়কের উপর অবস্থিত Important Social Infrastructure সমূহের নাম ও তার অবস্থান (Chainage) Input করতে হবে ।

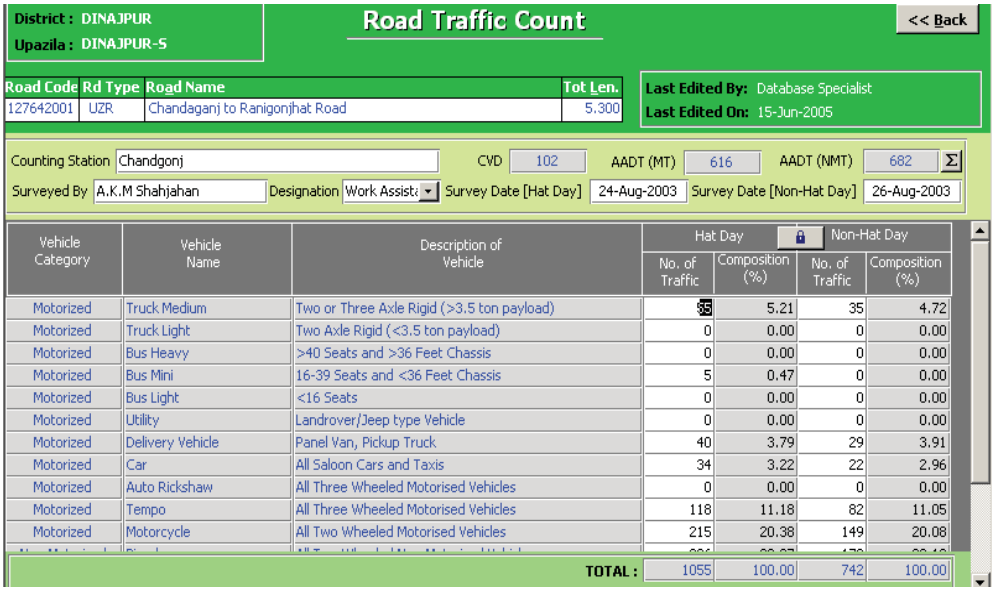
- **Tree** (Information about Tree plantation)**:**



উক্ত Tab Page-এ সড়কের দুই পার্শ্বে রোপিত বিভিন্ন ধরনের গাছের সংখ্যা, রোপনের বছর Input করতে হবে ।

⏩ Traffic Count ঃ

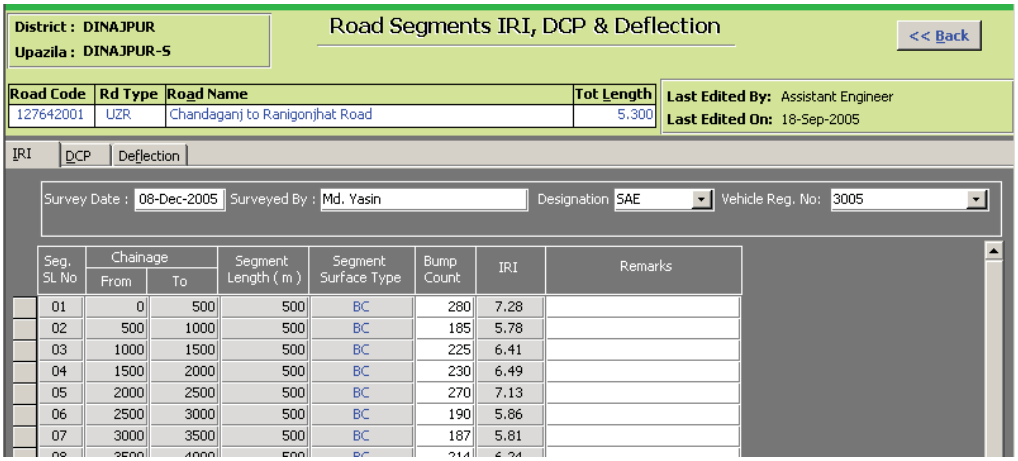
যে সড়কের জন্য Traffic Count Data Update/Edit করা হবে Road List Screen থেকে সেই সড়কটি Select করে Screen টির ডানদিকের উপরস্থ **Traffic Count >** Button-টি Click করলে নীচের *Road Traffic Count* Screen টি পাওয়া যাবে ।



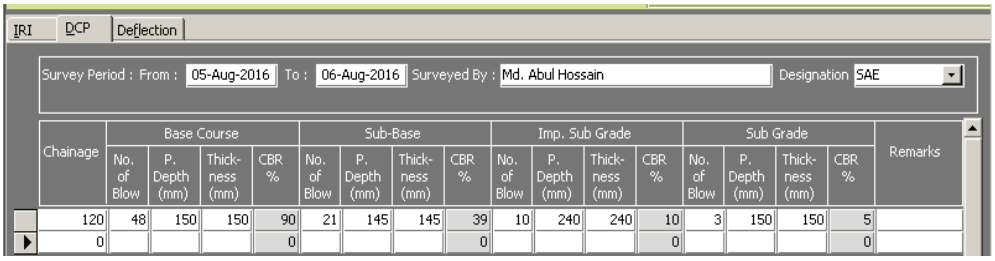
- সড়কের Traffic Survey সম্পন্ন করার পর Traffic Type ওয়ারী প্রাপ্ত সংখ্যা এখানে Input করতে হবে ।
- এখানে প্রদেয় তথ্যের উপর ভিত্তি করে Annual Average Daily Traffic (AADT) নির্ণিত হবে ।

⏩ IRI, DCP, Deflection ঃ

যে সড়কের জন্য Roughnss/DCP/Deflection Data Update/Edit করা হবে Road List Screen থেকে সেই সড়কটি Select করে Screen টির ডানদিকের উপরস্থ **IRI,DCP,Deflection >** Button-টি Click করলে নীচের *Road Segments IRI, DCP & Deflection* Screen টি পাওয়া যাবে ।



- এখানে সড়কের Roughness (IRI), DCP ও Deflection data entry করার জন্য ৩-টি Tab-page দেখা যাচ্ছে যেখানে সংশ্লিষ্ট তথ্য Input করতে হবে ।
- IRI Tab Page-এ গেলে দেখা যাবে যে Automatically সড়কটির বিপরীতে ৫০০ মি করে প্রযোজ্য সংখ্যক Segment তৈরি হয়ে আছে । Survey-কৃত Data সংশ্লিষ্ট Segment-এ Input করতে হবে । প্রদেয় Bump Count এর উপর ভিত্তি করে উক্ত Segemnt-এর IRI নির্ণিত হবে ।



- উক্ত Tab Page-এ Survey-কৃত সড়কের বিভিন্ন Chainage-এ Pavement Layer (Base Course, Sub-Base, ইত্যাদি) এর Actual Thickness, Penitrated Depth ও Total No of blow যথাক্রমে *Thickness, P. Depth & No. of Blow* column-এ Input করতে হবে । প্রদেয় তথ্যের উপর ভিত্তি করে উক্ত layer-এর CBR% নির্ণিত হবে ।
- *Deflection* Tab Page-এ Survey-কৃত Chainage-এর বিপরীতে প্রাপ্ত Reading Input করতে হবে ।

ব্রীজ/কালভার্ট সংক্রান্ত বিভিন্ন তথ্য **Input/Edit/Update** করার পদ্ধতি

Overview

- Structure Code এর Format
- Structure সংযোজন/সংশোধন
- Structure-এর Damaged Component Input করার পদ্ধতি
- Structure-এর Maintenance Plan, Maintenance History Input করার পদ্ধতি

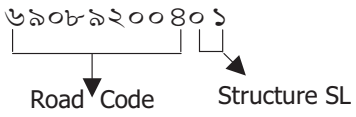
এই Module-এ RSDMS Software এর মাধ্যমে Structure-এর বিভিন্ন ধরনের তথ্য Input ও তা হালনাগাদ করার পদ্ধতি নিয়ে আলোচনা করা হবে ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Structure Code কোন Format-এ Automatically তৈরি হয় ।
- কিভাবে Structure সংযোজন/সংশোধন করা যায় ।
- কিভাবে Structure -এর Damaged Component Input করা যায় ।
- কিভাবে Structure -এর Maintenance History Input করা যায় ।

■ Structure Code:

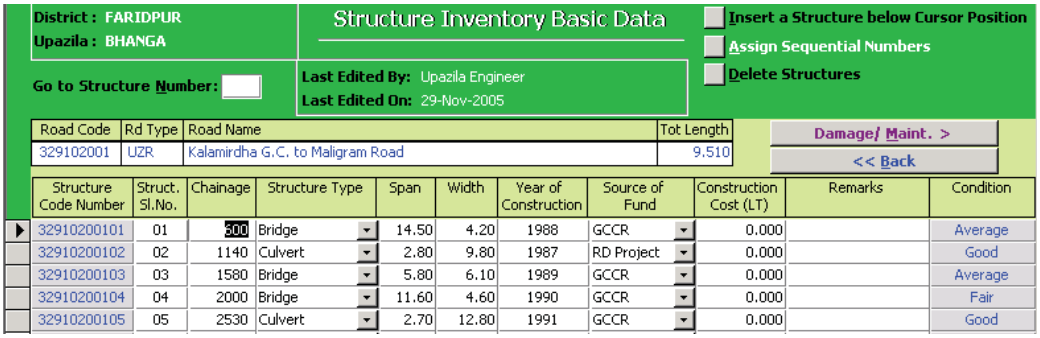
RSDMS Software-এর মাধ্যমে Structure Add করার সময় প্রতিটি Structure-এর জন্য Automatically ১টি Unique Structure Code তৈরি হয়ে থাকে, যা নিম্নরূপ ঃ



■ Structure সংক্রান্ত Data Entry করার পদ্ধতি ঃ

Structure –এর Data Entry অথবা Update করার লক্ষ্যে Switchboard থেকে

- প্রথমে নির্দিষ্ট উপজেলা Select করতে হবে ।
- অতঃপর **Road & Structure Relevant Data Entry** Button এ Click করলে Road List Screen-টি পাওয়া যাবে ।
- অতঃপর যে সড়কের Structure সংক্রান্ত তথ্য Add/Edit করা হবে Road List Screen থেকে সেই সড়কটি Select করে Screen টির ডানদিকের উপরস্থ **Structure** Button এ Click করলে নীচের Structure Inventory Basic Data Screen-টি দেখা যাবে।



District : FARIDPUR
Upazila : BHANGA

Structure Inventory Basic Data

Insert a Structure below Cursor Position
Assign Sequential Numbers
Delete Structures

Go to Structure Number:

Last Edited By: Upazila Engineer
Last Edited On: 29-Nov-2005

Road Code	Rd Type	Road Name	Tot Length
329102001	UZR	Kalamirdha G.C. to Maligram Road	9.510

Damage/ Maint. >
<< Back

Structure Code Number	Struct. Sl.No.	Chainage	Structure Type	Span	Width	Year of Construction	Source of Fund	Construction Cost (LT)	Remarks	Condition
32910200101	01	500	Bridge	14.50	4.20	1988	GCCR	0.000		Average
32910200102	02	1140	Culvert	2.80	9.80	1987	RD Project	0.000		Good
32910200103	03	1580	Bridge	5.80	6.10	1989	GCCR	0.000		Average
32910200104	04	2000	Bridge	11.60	4.60	1990	GCCR	0.000		Fair
32910200105	05	2530	Culvert	2.70	12.80	1991	GCCR	0.000		Good

- Screen-টির উপরের বামদিকে সংশ্লিষ্ট জেলা, উপজেলার নাম দেখা যাচ্ছে ।
- Go to Structure Number-এর ঘরে Structure-এর SL No Input করে {TAB} button Press করলে সরাসরি সেই Structure-টিতে চলে যাওয়া যাবে ।
- Screen-টিতে সড়কের নাম, Road Code, Road Type, Total Length দেখা যাচ্ছে ।
- সংশ্লিষ্ট সড়কের উপর অবস্থিত সকল প্রকার Structure/Existing Gap-এর তালিকা এবং উহাদের Basic Information (Chainage, Structure Type, Span, Width, Year of Construction, Source of Fund, Construction Cost) এখানে প্রদান করতে হবে ।

⏩ Screen এর Button সমূহের কার্যকারীতা ঃ

- **Insert a Structure below Cursor Position:** নতুন Structure Add করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Assign Sequential Numbers:** Structure সমূহ Chainage অনুযায়ী Sequential Order-এ থাকা প্রয়োজন । অনেকসময় মধ্যবর্তী কোন Structure Delete করার ফলে এই Order Sequentially থাকেনা । উক্ত Button-টি Click করলে Structure সমূহের Order Automatically Sequential হয়ে যাবে ।
- **Damage/Plan/Maint. :** উক্ত Button-টি Click করে Selected Structure-এর Damaged Component, Maintenance Plan ও Maintenance History Update করার Screen-এ যাওয়া যাবে ।
- **Back:** উক্ত Button-টি Click করে পূর্ববর্তী Screen-এ ফিরে যাওয়া যাবে ।

⏩ নতুন Structure অন্তর্ভূক্তিকরণ ঃ

- এজন্য **Insert a Structure below Cursor Position** Button-টি Click করতে হবে, অতঃপর Cursor Position-এর নিচে ১টি Row তৈরি হবে ।
- এখন Structure-টির অবস্থান (Chainage) input করতে হবে, Structure Type Select করতে হবে এবং Structure-এর Span, Width, Year of Construction, Source of Fund, Construction Cost input করতে হবে ।

⏩ Structure Delete ঃ

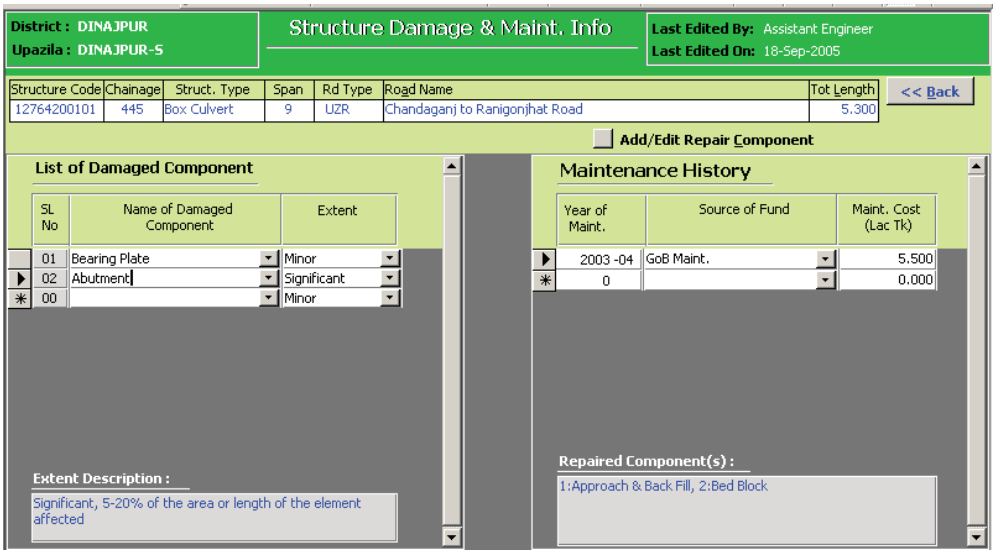
- প্রথমে যে Structure-টি Delete করতে ইচ্ছুক সেটিকে Select করতে হবে ।
- অতঃপর Menu থেকে Delete Button-টি Click করে Selected Structure-টি মুছে ফেলা যাবে ।

Note :
- Structure অন্তর্ভূক্তিকরণ প্রক্রিয়ায় Existing Gap ও এখানে Add করা যাবে ।
- এক্ষেত্রে Structure Type -এর স্থলে *Existing Gap* Select করতে হবে ।
- আবার কোন Existing Gap -এর স্থলে Structure নির্মান করা হলে তা নতুনভাবে Entry না করে প্রযোজ্য Structure-টির Type পরিবর্তন করে দিতে হবে ।
- কোন Structure-এর বিপরীতে *Status* কলামে Damaged দেখা গেলে বোঝা যাবে উক্ত Structure-টিতে Damaged Component বিদ্যমান ।

⏩ Damage/ Maintenance History ঃ

RSDMS Software-এর মাধ্যমে Structure-এর বিপরীতে Damaged Component List, Maintenance Plan, Maintenance History ইত্যাদি তথ্য সংরক্ষণ করা হয়ে থাকে ।

যে Structure-এর জন্য উপরোক্ত তথ্য Update/Edit করা হবে Structure Inventory Screen থেকে সেই Structure-টি Select করে Screen টির ডানদিকের উপরস্থ **Damage/Plan/Maint.** Button-টি Click করলে নীচের *Structure Damage & Maintenance Data* Screen টি পাওয়া যাবে ।



উপরোক্ত Screen-এ List of Damaged Component ও Maintenance History নামক ৩টি অংশ দেখা যাচ্ছে, নিম্নে এ নিয়ে আলোচনা করা হলো ঃ

❑ List of Damaged Component:

সার্ভে সম্পন্ন করার পর Structure-এর বিপরীতে যে সকল Damage Component সমূহ পাওয়া যাবে সেগুলিকে Screen-এর উক্ত অংশে তালিকাভুক্ত করতে হবে এবং Damage-এর Extent উল্লেখ করতে হবে ।

- Name of Component-এর Drop-down List-এ Structure-এর সম্ভাব্য সকল Component সমূহের তালিকা দেওয়া আছে ।
- Structure-এর Damage Component সমূহকে উক্ত List থেকে Select করতে হবে । Structure-টি সম্পূর্ণরূপে Damage হয়ে থাকলে List থেকে *Whole Structure* Select করা যেতে পারে ।
- Extent column-এ Extent (Minor, Significant, Major, Extensive) select করার পর Screen-এর নীচের অংশে Extent-এর Detail Description দেখা যাবে।

- **Maintenance History:**

  Structure-এর রক্ষণাবেক্ষণের History Screen-এর উক্ত অংশে Update করতে হবে ।

  - রক্ষণাবেক্ষনের History Add করার জন্য Screen এর উপরের ডান দিকে অবস্থিত **Add Maintenance History** Button-টি Click করতে হবে ।
  - অতঃপর Year of Maintenance, Source of Fund, Maintenance Cost Input করতে হবে ।
  - অতঃপর উক্ত রক্ষণাবেক্ষনের আওতায় যে সকল Component মেরামত করা হয়েছে তা Select করতে হবে । এজন্য Maintenance Plan এর Component Select করার প্রক্রিয়া অনুসরন করতে হবে ।
  - রক্ষণাবেক্ষনের আওতায় মেরামতকৃত Component Select করার পর দেখা যাবে উক্ত Component সমূহ Damaged List থেকে Automatically মুছে গেছে ।

Annual Maintenance Need & Work Program নির্ণয় করার পদ্ধতি

Overview

- নির্দিষ্ট সময়ান্তর, নিয়মিত ও অন্যান্য রক্ষণাবেক্ষণের প্রাথমিক Annual Maintenance Need তৈরি
- Annual Maintenance Need থেকে প্রাপ্ত বরাদ্দ মোতাবেক সংশ্লিষ্ট জেলার Work Program তৈরি
- Work Program-কে Scheme List-এ রুপান্তরিত করার পদ্ধতি

এই Module-এ RSDMS Software এর মাধ্যমে Annual Maintenance Need, Work Program তৈরি ও Work Program-কে Scheme List-এ রুপান্তরিত করার পদ্ধতি নিয়ে আলোচনা করা হবে ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- RSDMS Software এর মাধ্যমে কিভাবে সয়ংক্রিয়ভাবে নির্দিষ্ট সময়ান্তর, নিয়মিত ও অন্যান্য রক্ষণাবেক্ষণের Annual Maintenance Need assess করা যায় ।
- Annual Maintenance Need - থেকে কিভাবে প্রাপ্ত বরাদ্দ মোতাবেক সংশ্লিষ্ট জেলার Work Program তৈরি করা যায়
- কিভাবে Annual Maintenance Need-কে Scheme List এ রুপান্তরিত করা যায় ।

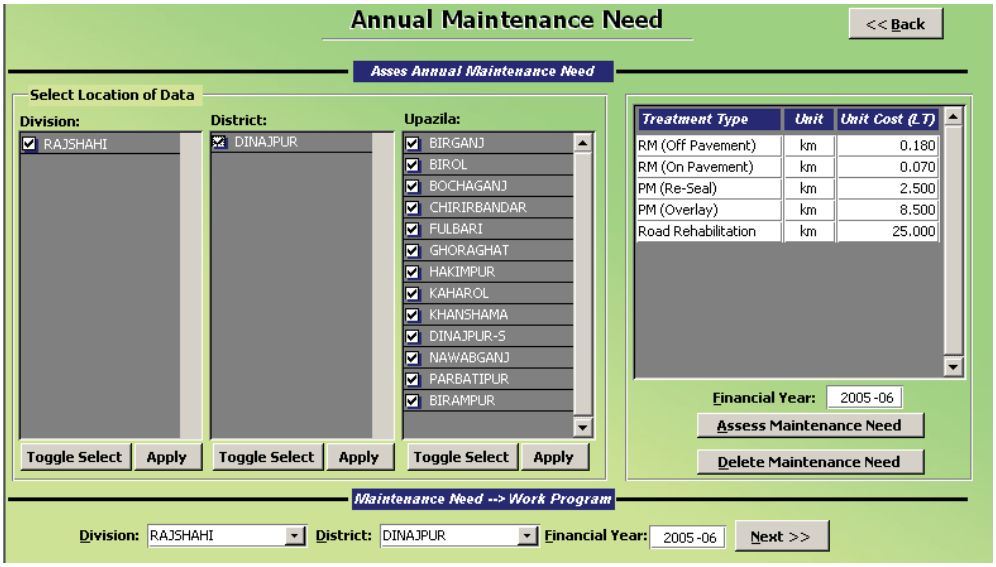
প্রতিবছর GoB Maintenance এর বরাদ্দ প্রাপ্তির জন্য মন্ত্রণালয়ে Maintenance এর চাহিদা Submit করতে হয় । উক্ত কাজের জন্য Maintenance Need তৈরি করা প্রয়োজন ।

এখানে Annual Maintenance Need, Work Program তৈরি এবং উক্ত পর্যায় হতে Scheme List তৈরির পদ্ধতি নিয়ে আলোচনা করা হবে ।

⏩ Annual Maintenance Need ঃ

Annual Maintenance Need তৈরি করার লক্ষ্যে Switchboard থেকে

- **Annual Maintenance Need & Work Program** Button এ Click করলে নিচের Screen-টি পাওয়া যাবে ।

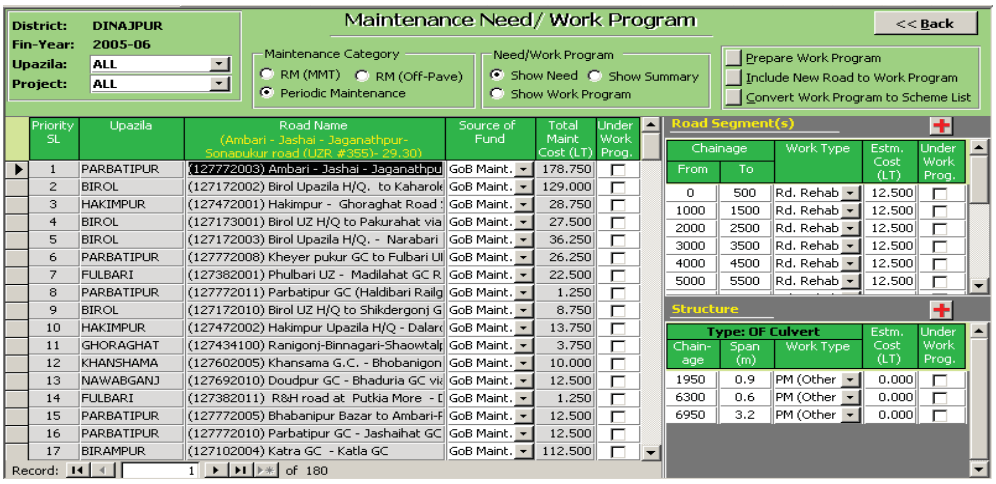


- Annual Maintenance Need নির্ধারনের জন্য প্রথমে সংশ্লিষ্ট জেলা/উপজেলা select-করতে হবে। এখানে বিভিন্ন রক্ষণাবেক্ষণের ধরন অনুযায়ী সেগুলির Unit Cost দেখা যাচ্ছে, যা সদর দপ্তর হতে নির্ধারণ করা হয়েছে।
- অতঃপর Financial Year এর ঘরে Need নির্ধারনের নিমিত্তে প্রযোজ্য অর্থবছর Type করতে হবে।
- অবশেষে **Assess Maintenance Need** Button এ Click করতে হবে।
- Software-টি Database এ প্রদেয় Rapid Condition Survey এবং Roughness Survey data-এর উপর ভিত্তি করে automatically Annual Maintenance Need assess করে দিবে।

View Annual Maintenance Needঃ

Annual Maintenance Need view/edit করার লক্ষ্যে Annual Maintenance Need Screen-টি থেকে নির্দিষ্ট জেলা ও অর্থবছর Select করতে হবে

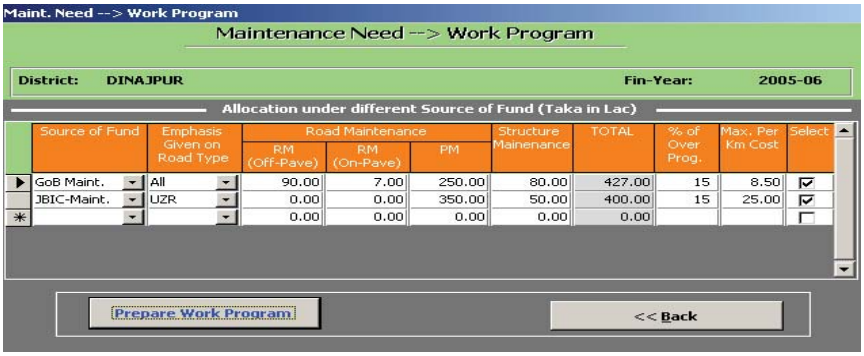
- অতঃপর **Next** Button এ Click করলে নিচের Screen-টি পাওয়া যাবে ।



- এখানে দেখা যাচ্ছে যে, Software-টি Database এ প্রদেয় Rapid Condition Survey এবং Roughness Survey data-এর উপর ভিত্তি করে automatically Annual Maintenance Need assess এবং একইসাথে রক্ষণাবেক্ষণযোগ্য সড়কসমূহের Priority নির্ধারণ করে দিয়েছে।
- এখানে বিভিন্ন রক্ষণাবেক্ষণের ধরন অনুযায়ী (Routine Maintenance (MMT), Routine Maintenance (Off-Pavement), Periodic Maintenance) উক্ত বছরের জন্য রক্ষণাবেক্ষণের চাহিদা দেখা যাবে। সেজন্য সংশ্লিষ্ট **Radio Button** এ Click করতে হবে।
- উপরোক্ত Screen-এ Periodic Maintenance এর **Radio Button** টি selected আছে বিধায় Periodic Maintenance এর Need দেখা যাচ্ছে।

Prepare Work Programঃ

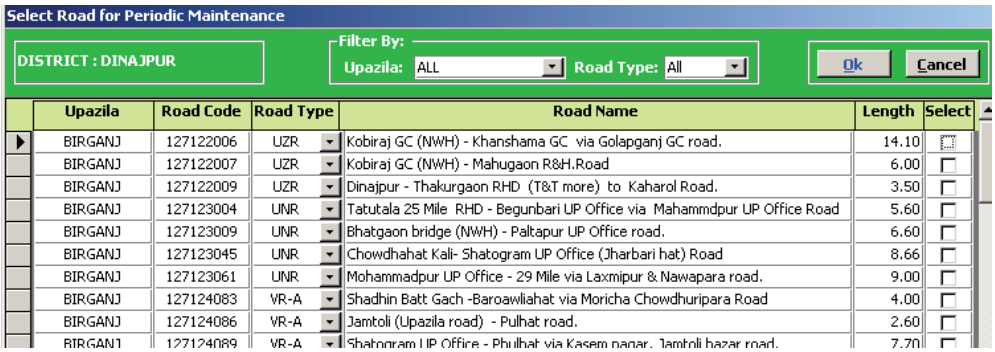
Work Program তৈরি করার লক্ষ্যে Annual Maintenance Need/ Work Program Screen-টি থেকে **Prepare Work Program** Button এ Click করলে নিচের Screen-টি পাওয়া যাবে



- এখানে বিভিন্ন প্রকল্প হতে প্রাপ্ত রক্ষণাবেক্ষণের ধরন অনুযায়ী বরাদ্দসমূহ ও অন্যান্য প্রয়োজনীয় তথ্য Input করতে হবে।
- অতঃপর **Prepare Work Program** Button এ Click করলে Software-টি বরাদ্দ মোতাবেক Work Program তৈরি করে দিবে যা পরবর্তীতে সংযোজন/সংশোধন করা সম্ভব।

Include New Road to Work Programঃ

Work Program- এ নতুন সড়ক সংযোজন করতে চাইলে প্রথমে সংশ্লিষ্ট Mantenance Category Select করতে হবে। এখন **Include New Road to Work Program** Button এ Click করতে হবে। অতঃপর নিচের Screen-টি পাওয়া যাবে



Upazila	Road Code	Road Type	Road Name	Length	Select
BIRGANJ	127122006	UZR	Kobiraj GC (NWH) - Khanshama GC via Golapganj GC road.	14.10	
BIRGANJ	127122007	UZR	Kobiraj GC (NWH) - Mahugaon R&H.Road	6.00	
BIRGANJ	127122009	UZR	Dinajpur - Thakurgaon RHD (T&T more) to Kaharol Road.	3.50	
BIRGANJ	127123004	UNR	Tatutala 25 Mile RHD - Begunbari UP Office via Mahammdpur UP Office Road	5.60	
BIRGANJ	127123009	UNR	Bhatgaon bridge (NWH) - Paltapur UP Office road.	6.60	
BIRGANJ	127123045	UNR	Chowdhahat Kali- Shatogram UP Office (Jharbari hat) Road	8.66	
BIRGANJ	127123061	UNR	Mohammadpur UP Office - 29 Mile via Laxmipur & Nawapara road.	9.00	
BIRGANJ	127124083	VR-A	Shadhin Batt Gach -Baroawliahat via Moricha Chowdhuripara Road	4.00	
BIRGANJ	127124086	VR-A	Jamtoli (Upazila road) - Pulhat road.	2.60	
BIRGANJ	127124089	VR-A	Shatogram UP Office - Phulhat via Kasem nagar, Jamtoli hazar road.	7.70	

- এখানে প্রয়োজনীয় সড়ক/ সড়কসমূহ Select করতে হবে।
- অতঃপর **OK** Button এ Click করতে হবে।

Convert Work Program to Scheme Listঃ

Autometically Work Program থেকে Scheme List তৈরি করতে চাইলে **Convert Work Program to Scheme List** Button এ Click করতে হবে।

নিশ্চিত হওয়ার লক্ষে Screen-এ Confirmation Message Box দেখা যাবে। উক্ত Message Box -এর **YES** Button এ Click করলে Software-টি **Scheme List** তৈরি করে দিবে।

Note :
- Under Work Program Box-টি Select থাকার অর্থ উক্ত সড়কটি Work Program -এর অর্ন্তভূক্ত।
- Show Need, Show Work Program, Show Summary **Radio Button** এ Click করে সংশ্লিষ্ট তথ্য দেখা যাবে।

Scheme/Progress সংক্রান্ত তথ্য Input/Edit করার পদ্ধতি

Overview

- নির্দিষ্ট সময়ান্তর, নিয়মিত ও অন্যান্য রক্ষণাবেক্ষণের Scheme List তৈরি
- অন্যান্য প্রকল্পের Scheme List তৈরি
- Package তৈরি
- Scheme সমূহের মাসিক Progress এর বিবরণী
- Contractor List ও Supervisor-দের বিস্তারিত তথ্য

এই Module-এ RSDMS Software এর মাধ্যমে Scheme List তৈরি ও Scheme সমূহের মাসিক Progress Input করার পদ্ধতি নিয়ে আলোচনা করা হবে ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

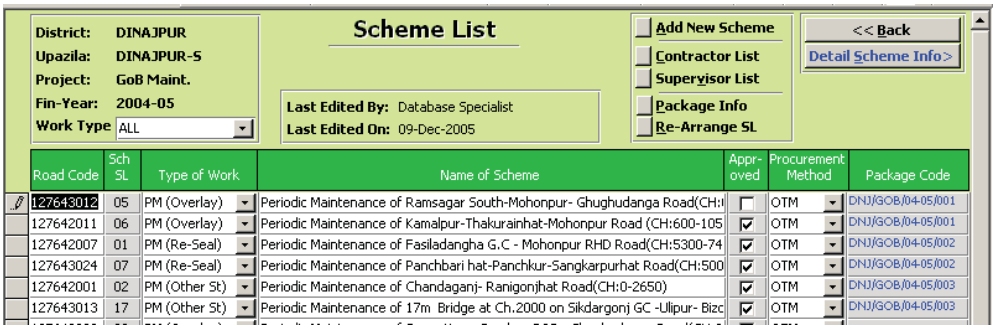
- কিভাবে নির্দিষ্ট সময়ান্তর, নিয়মিত ও অন্যান্য রক্ষণাবেক্ষণের Scheme List তৈরি করা যায় ।
- কিভাবে অন্যান্য প্রকল্পের Scheme List তৈরি যায় ।
- কিভাবে Package তৈরি যায় ।
- কিভাবে Scheme সমূহের মাসিক Progress Input করা যায় ।
- কিভাবে Contractor List ও Supervisor-দের বিস্তারিত তথ্য Input করা যায় ।

⏩ Scheme List ঃ

এখানে বাস্তবায়নের লক্ষ্যে গৃহীত সকল Scheme সমূহেকে তালিকাভুক্ত করতে হবে । GoB Maintenance সহ অন্যান্য সকল প্রকল্পের Scheme List এখানে তৈরি করা যাবে ।

Scheme List তৈরি করার লক্ষ্যে Switchboard থেকে

- প্রথমে নির্দিষ্ট উপজেলা, প্রকল্প ও অর্থবছর Select করতে হবে ।
- অতঃপর **Scheme List** Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।

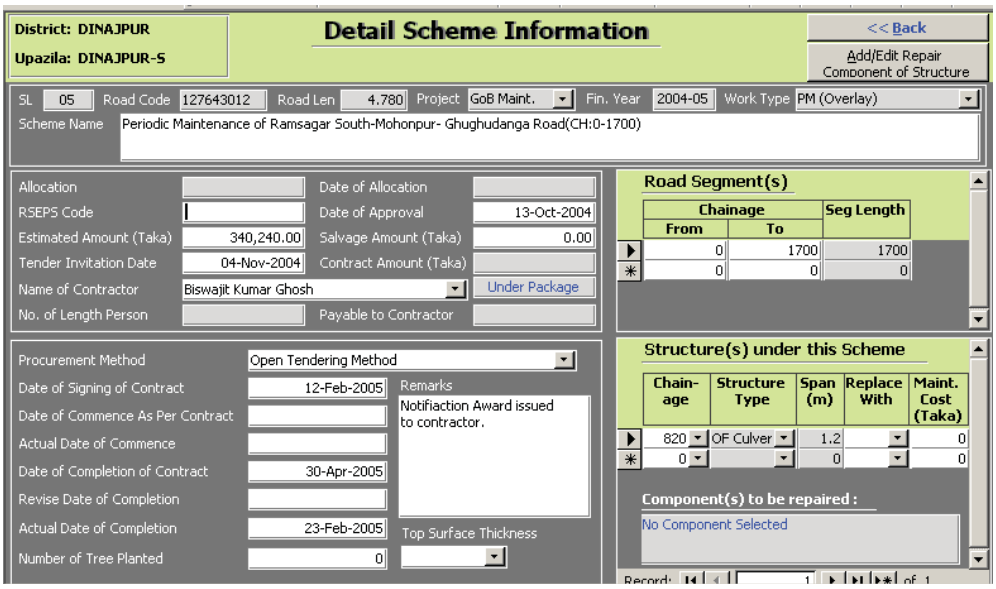


⏩ Add New Scheme ঃ

উক্ত Button-টি Click করেও একের পর এক Scheme তালিকাভুক্ত করা যায় । এক্ষেত্রে Button-টি Click করার পর Screen এর নিচের দিকে ১টি Row তৈরি হবে যেখানে Road Code, Type of Work, Name of Scheme ইত্যাদি Input করতে হবে ।

⏩ Detail Scheme Info ঃ

উক্ত Button-টি Click করে কোন Scheme-এর বিস্তারিত তথ্য প্রদান করা যাবে । Screen টি নিম্নরূপ ঃ

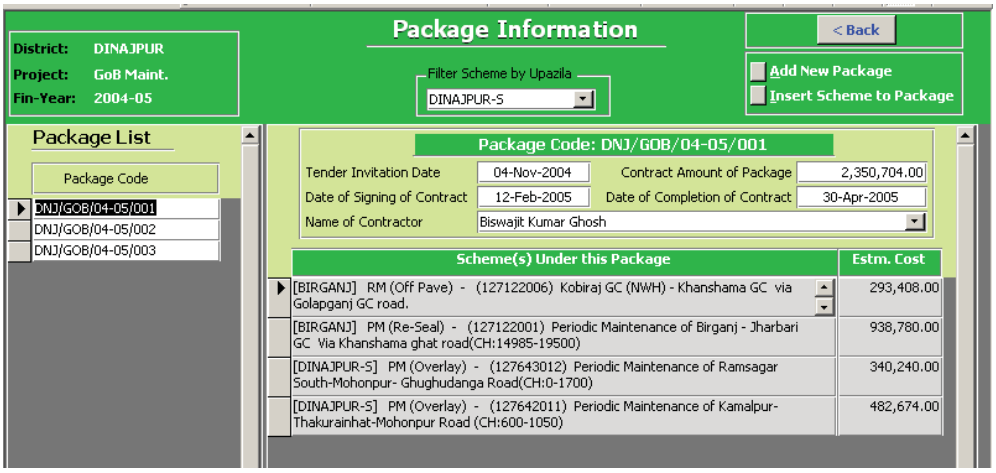


- এখানে Scheme এর Estimated Amount, Salvage Amount, Contract Amount, ইত্যাদি তথ্য Input করতে হবে ।
- **Road Segment(s)**-এ সড়কের Scheme এর জন্য প্রযোজ্য Starting-Ending Chainage উল্লেখ করতে হবে ।
- **Structure(s) under this Scheme**-এ Scheme এর জন্য প্রযোজ্য Structure এর Location, Component Select করতে হবে । *Add/Edit Repair Component of Structure* Button-টি Click Component Select করা যাবে ।

Note :
- RSEPS Code Input করলে Software-টি Automatically RSEPS থেকে (যদি একই কম্পিউটারে থাকে) Name of Scheme, Estimated Amount, Salvage Amount নিয়ে আসবে ।
- Structure এর মূল Screen-এ Damaged Component তালিকাভুক্ত করা না থাকলে তা এখানে দেখা যাবে না ।

⏩ Package Info ঃ

উক্ত Button-টি Click করে নিম্নোক্ত Screen-টি পাওয়া যাবে, যেখানে Package তৈরি করা যাবে ।



- **Package Add/Edit ঃ**
  - Screen-টির উপরের ডান দিকে অবস্থিত "**Add New Package**" Button-টি Click করলে Package List এর সর্বনিম্নে ১টি Package তৈরি হয়ে যাবে এবং Default-ভাবে ১টি Package Code তৈরি হবে ।
  - Package টির কোন সুনির্দিষ্ট কোড থাকলে Auto Generate-কৃত কোডটি মুছে ফেলে সেই কোডটি Input করতে হবে ।

- **Package-এ Scheme আনয়ন ঃ**

  - Screen-টির উপরের ডান দিকে অবস্থিত **"Insert Scheme to Package"** Button-টি Click করতে হবে ।
  - এখন Scheme List দেখা যাবে ।
  - এখন Package এ ব্যবহৃত Scheme-গুলিকে উক্ত List থেকে টিক দিয়ে Select করতে হবে ।
  - অতঃপর **OK** Button-টি Click করতে হবে ।

  এভাবে প্রতিটি Package এর জন্য Scheme Select করা যায় ।

Contractor List ঃ

উক্ত Button-টি Click করে নিম্নোক্ত Screen-টি পাওয়া যাবে, যেখানে Contractor-দের তালিকা তৈরি করা যাবে ।

- Screen-টির উপরের দিকে অবস্থিত **"Add New Contractor"** Button-টি Click করলে Contractor List এর সর্বনিম্নে ১টি row তৈরি হয়ে যাবে যেখানে Contractor-এর নাম, ঠিকানা Input করা যাবে ।

Supervisors ঃ

উক্ত Button-টি Click করে নিম্নোক্ত Screen-টি পাওয়া যাবে, যেখানে অর্থবছর ও উপজেলা অনুযায়ী Supervisor-দের তালিকা তৈরি করা যাবে ।

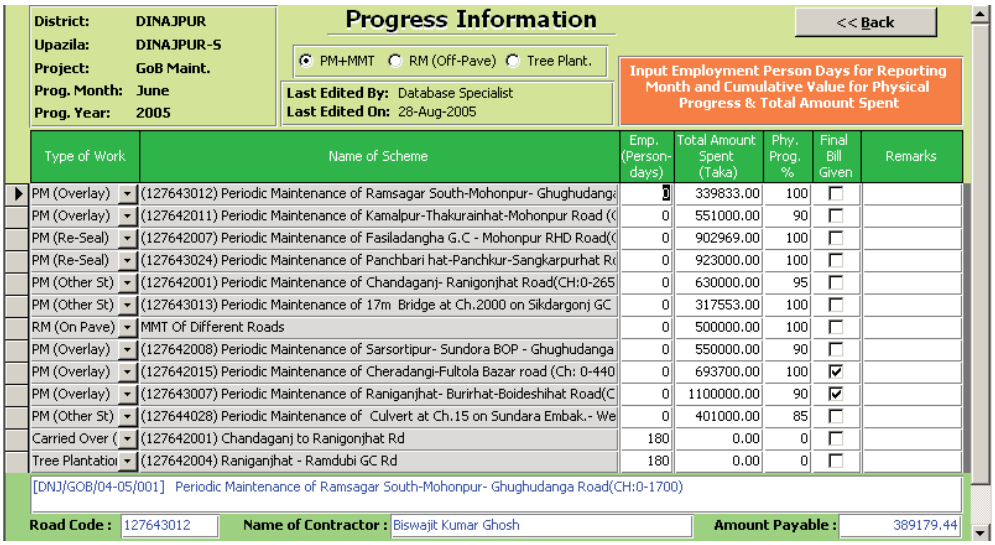
- Screen-টির উপরের দিকে অবস্থিত **"Add New Supervisor"** Button-টি Click করলে Supervisor List এর সর্বনিম্নে ১টি row তৈরি হয়ে যাবে যেখানে Supervisor -এর নাম সহ প্রয়োজনীয় বিস্তারিত তথ্য Input করা যাবে ।

- প্রতিটি Supervisor-এর উপর ন্যস্ত ইউনিয়নের নামসমূহ Screen-টির ডান দিকে অবস্থিত "*Name of Assigned Union under: Supervisor Name*" column-এ select করে দিতে হবে ।
- অতঃপর Supervisor-দের দায়িত্বপ্রাপ্ত সড়কসমূহ সুনির্দিষ্টকরণের লক্ষ্যে সংশ্লিষ্ট Scheme-এর বিপরীতে Supervisor-এর নাম select করে দিতে হবে ।

▸▸ Monthly Progress ঃ

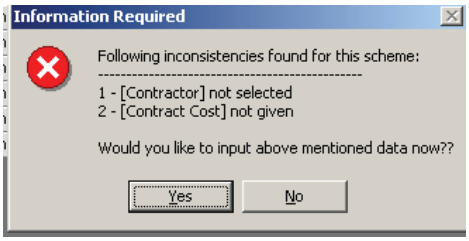
Scheme-এর Progress প্রদান করার লক্ষ্যে Switchboard থেকে

- প্রথমে নির্দিষ্ট উপজেলা, প্রকল্প, অর্থবছর, Prog. Month ও Prog. Year Select করতে হবে ।
- অতঃপর **Monthly Progress** Button এ Click করলে নিচের Progress Information Screen-টি পাওয়া যাবে ।



- Software-টি Automatically Database থেকে Select-কৃত উপজেলা ও প্রকল্প অনুযায়ী Approved Scheme সমূহের জন্য Select-কৃত Progress Month ও Progress Year-এর ১টি তালিকা তৈরি করে দিবে ।
- কোন Scheme-এর বিপরীতে *Approved* কলামে টিক না দেওয়া থাকলে সেই Scheme-টি Progress-এর তালিকায় দেখা যাবে না । এমতবস্থায়, ভুলবশতঃ কোন Scheme বাদ পড়ে গেলে *Scheme List Screen*-এ গিয়ে সংশ্লিষ্ট Scheme-এর বিপরীতে *Approved* কলামে টিক দিয়ে আসতে হবে । অতঃপর **Re-Generate Progress List** Button-এ Click করলে Scheme-টি Progress-এর তালিকায় দেখা যাবে ।
- উক্ত Screen-এ Scheme গুলিকে *Except RM (Off-Pave)* ও *RM (Off-Pave)* এই ২ ভাগে বিভক্ত করা হয়েছে । *Work Type*-এর যে কোন ১টি Option select করে সেই অনুযায়ী Scheme-এর তালিকা দেখা যাবে ।

- *Emp.(Person Days)/ No of Tree Planted/ No of Tree Survived* কলামে Scheme-টির বিপরীতে উক্ত মাসের এর Employment Generation-এর তথ্য প্রদান করতে হবে ।
- *Physical Progress/ Total Amount Spent* কলামে Scheme-টির বিপরীতে Cumulative তথ্য প্রদান করতে হবে ।
- কোন Scheme এর Final Bill প্রদান করা হয়ে থাকলে সেই Scheme-এর বিপরীতে *Final Bill Given* কলামে টিক দিতে হবে । এতে করে পরবর্তী মাসের জন্য Progress Add করার সময় উক্ত Scheme-টি তালিকায় দেখা যাবেনা ।
- Progress এর তথ্য প্রদান করার সময় যদি Scheme এর প্রয়োজনীয় তথ্যাদি update না করা থাকে সেক্ষেত্রে নিম্নোক্ত টি দেখা যাবে ঃ



এমতবস্থায় **Yes** Button এ Click করে সংশ্লিষ্ট Scheme-এর Detail Scheme Information Screen-এ চলে যাওয়া যাবে এবং প্রয়োজনীয় তথ্যাদি update না করা যাবে।

Note :
- Data Entry করার সুবিধার্থে কলাম Lock/Unlock করা যায় । এইজন্য Emp. (Person Days)/Physical Progress/Total Amount Spent/Final Bill Given/Remark কলামের Header- এ Click করলে সংশ্লিষ্ট কলামটি Lock/Unlock হয়ে যাবে ।

Data Export/Import করার পদ্ধতি

Overview

- কিভাবে Road & Structure related data Export/Import করা যায়
- কিভাবে Scheme List Export/Import করা যায়
- কিভাবে Progress Data Export/Import করা যায়

এই Module-এ আমরা Data Export/Import- এর বিভিন্ন ধরনের Option ও পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

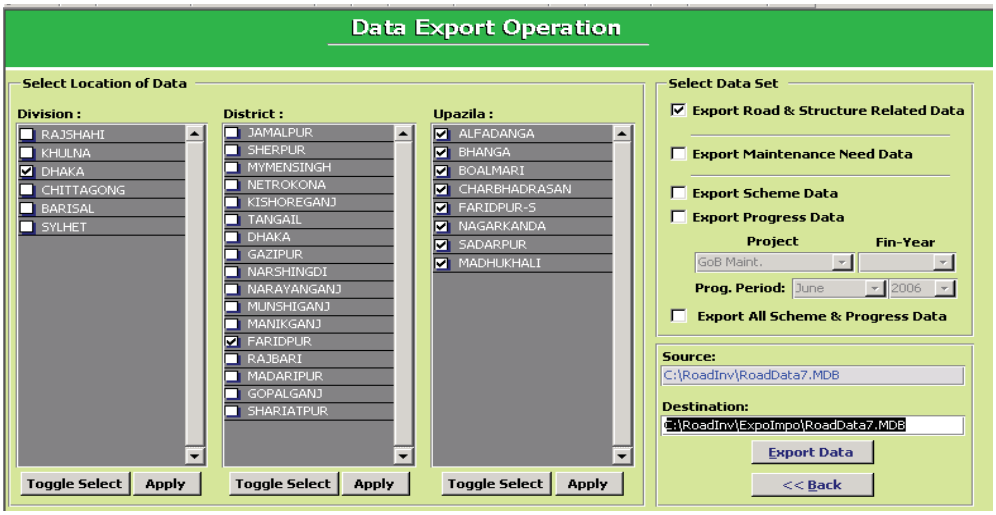
- কিভাবে Road & Structure related data Export করা যায় ।
- কিভাবে Scheme List Export করা যায় ।
- কিভাবে Progress data Export করা যায় ।
- কিভাবে Road & Structure related data Import করা যায় ।
- কিভাবে Scheme List Import করা যায় ।
- কিভাবে Progress data Import করা যায় ।

RSDMS Software-এর মাধ্যমে উপজেলা পর্যায়ে Road & Structure, Scheme ইত্যাদির সকল তথ্য Input করা হয় । কিন্তু জেলা অফিসে সংশ্লিষ্ট সকল উপজেলা এবং সদর দপ্তরে সকল উপজেলার তথ্য সন্নিবেশিত থাকা প্রয়োজন ।

উক্ত লক্ষ্যে উপজেলা থেকে জেলা/সদর দপ্তর, জেলা থেকে সদর দপ্তর বা এক Computer থেকে অন্য Computer-এ Data Exchange-এর লক্ষ্যে RSDMS Software-টিতে Export/Import পদ্ধতি সংযোজন করা হয়েছে ।

⏩ Data Export করার পদ্ধতি ঃ

Switch Board-এর "**Data Export Operation**" Button-টি Click করে Export-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- **Select Location of Data:**

  যে উপজেলা/উপজেলা সমূহের Data Export করা হবে এখান থেকে সেই উপজেলা সমূহকে Select করতে হবে ।

- **Select Data Set:**

  এখান থেকে প্রয়োজনীয় এক বা একাধিক Option Select করতে হবে । Scheme/Progress-এর ক্ষেত্রে একাধিক Project-এর তথ্য একত্রে পাঠানোর প্রয়োজন হলে *Project Combo box* থেকে *<-Multiple Projects->* Option-টি select করতে হবে অতঃপর প্রাপ্ত Screen থেকে একাধিক Project select করা যাবে ।

- **Destination:**

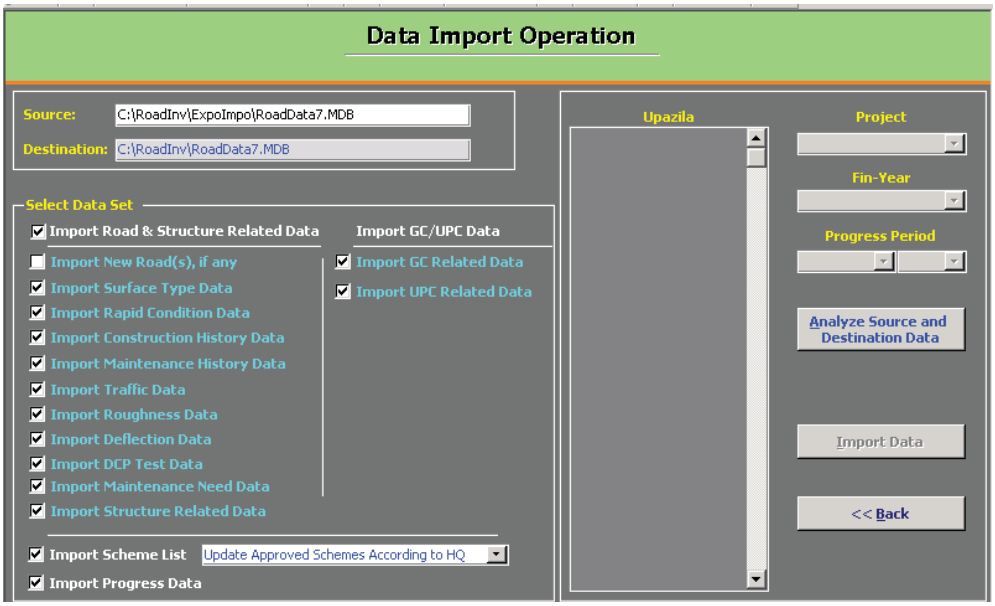
  Export Operation শেষ হওয়ার পর Destination Box-এ উল্লেখিত Location-এ Data File-টি তৈরি হবে । উপরোক্ত Screen অনুযায়ী Export করার পর "**C:\RoadInv\ExpoImpo**" Folder-এর মধ্যে **RoadData7.MDB** নামক ১টি File তৈরি হবে ।

- অতঃপর **Export Data** Button-টি Click করতে হবে ।

- অবশেষে Destination Box-এ উল্লেখিত Location থেকে Data File-টি যে কোন Removable Drive (CD, Mobile Drive)-এ Copy করে পাঠাতে হবে।

⏩ Data Import করার পদ্ধতি ঃ

Switch Board-এর "**Data Import Operation**" Button-টি Click করে Import-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- প্রথমে Import-কৃত File-টিকে "**C:\RoadInv\ExpoImpo**" Path-এ রাখতে হবে। তবে প্রয়োজনে অন্য Location থেকেও Import করা সম্ভব । সেক্ষেত্রে Source-এর স্থলে File-টির Path ও File Name (Extension সহ) Type করে দিতে হবে ।
- এবার **Data Set** থেকে সংশ্লিষ্ট Option/ Option সমূহ Select করতে হবে ।
- এবার **Analyze Source and Destination data** Button-টি Click করতে হবে ।
- এখন Software-টি Source এবং Destination-এর data analyze করবে এবং বিভিন্ন ধরনের ত্রুটি-বিচ্যুতির (যদি থাকে) তালিকা সম্বলিত Report প্রদান করবে ।
- একইসাথে Software-টি Source data-তে available Upazila, Project ইত্যাদির তালিকা প্রদর্শন করবে যেখান থেকে প্রয়োজন অনুযায়ী Selection পরিবর্তন করা যাবে।
- Report-টি পর্যবেক্ষণের পর Import এর ব্যাপারে নিশ্চিত হলে **Import Data** Button-টি Click করে data Import যাবে ।

RSDMS Software এর বিভিন্ন Report Print করার পদ্ধতি

Overview

- Road Inventory Related Reports
- Summary Reports
- Structure Related Reports
- Need, Scheme, Progress Related Report
- Blank & Miscellaneous Reports
- Filtering Data in Report

এই Module-এ আমরা RSDMS-এর বিভিন্ন ধরনের Report নিয়ে আলোচনা করবো ।

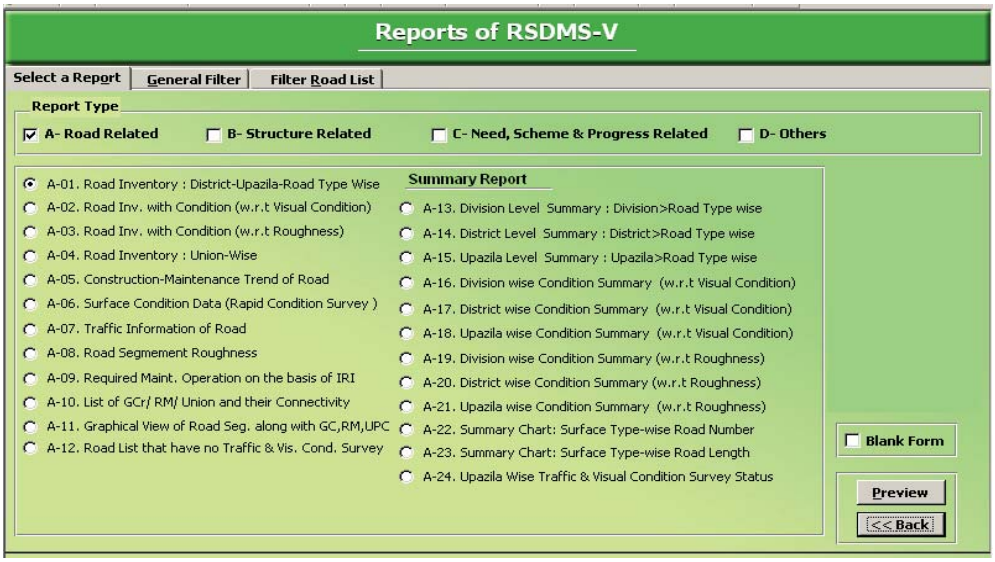
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- RSDMS Software-এ কি কি Report Available ।
- এই সকল Report Print করার সময় Data-এর Location Selection পদ্ধতি ।
- এই সকল Report Print করার সময় বিভিন্ন Filtering Option প্রয়োগের পদ্ধতি ।
- Option প্রয়োগের মাধ্যমে Report Print করার পদ্ধতি ।

RSDMS Software হতে প্রাপ্ত বিভিন্ন ধরনের Output Format-কে আমরা Report বলে থাকি । Report সমূহ আমরা Report Generation Option থেকে পেয়ে থাকি । বিভিন্ন ধরনের Option ব্যবহার করে উক্ত Report সমূহ Print করার পদ্ধতি এখানে আলোচনা করা হলো ।

⏩ Report Generation ঃ

Switch Board-এর "**Reports Generation**" Button-টি Click করে Report-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



এখানে Report সমূহকে ৪টি Category-তে বিভক্ত করা হয়েছে যথা ঃ

A - Road Related Reports

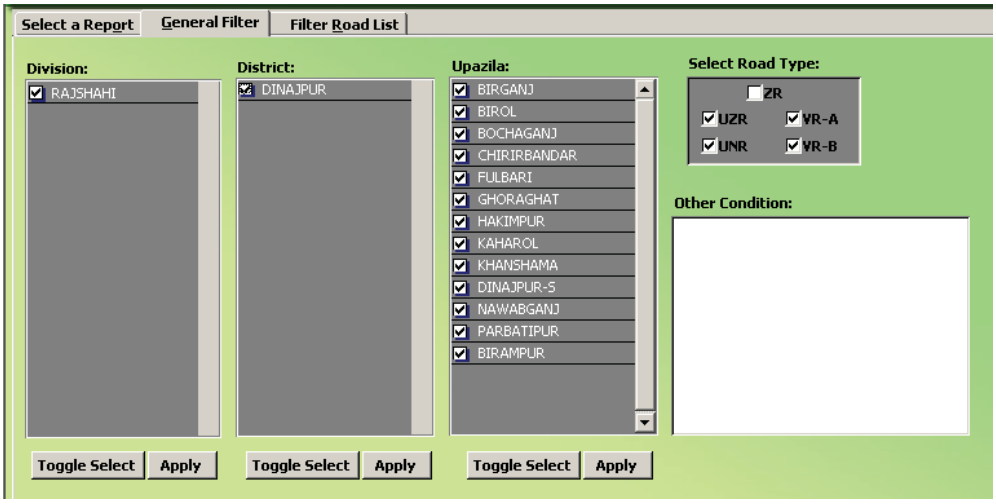
B - Structure Related Reports

C - Need, Scheme & Progress Related Reports

D - Other Reports

⏩ General Filter (Location of Data) ঃ

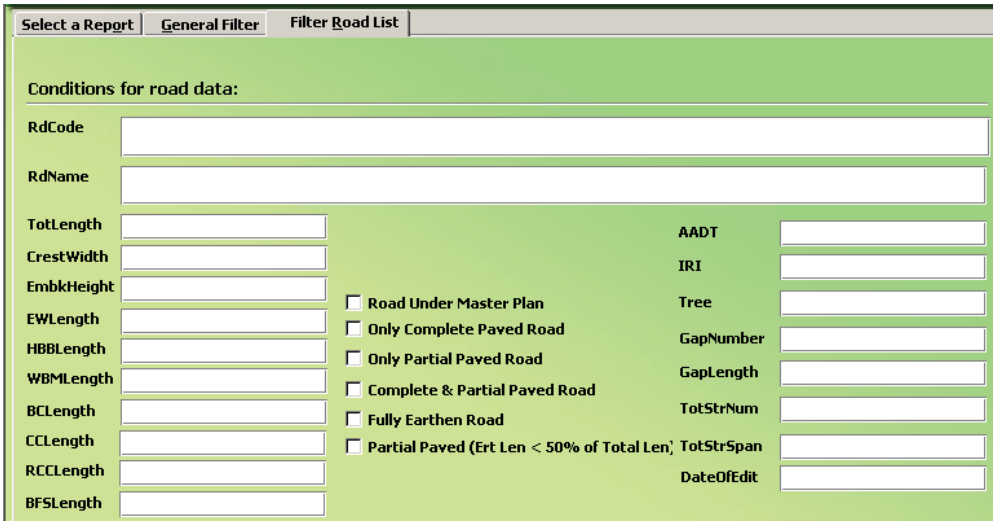
RSDMS-এর কোন Report Print করার পূর্বে Data-এর Location নির্ধারন করা প্রয়োজন । কেননা Select-কৃত Location-এর Data নিয়েই RSDMS-এর Report সমূহ Print হয়ে থাকে । Screen-টির *General Filter* Tab থেকে Data-এর Location (Upazila) Select করা যায় ।



- Upazila Selection এর পাশাপাশি এখানে Road Type ও Select করা যায় ।

⏩ Filter Road List ঃ

Road Related Report Print করার সময় উক্ত Tab Page দেখা যাবে ।



এখানে বিভিন্ন Option দেখা যাচ্ছে । প্রয়োজন অনুযায়ী এসকল Option-এ Condition প্রয়োগ করে সেই অনুযায়ী Filter-কৃত Report পাওয়া সম্ভব । যেমন ঃ

- *RdCode*-এর ঘরে কিছু নির্দিষ্ট সংখ্যক Road Code কমা দ্বারা Seperate করে Type করে শুধুমাত্র সেইসকল সড়কসমূহের Report পাওয়া সম্ভব ।

- *Road Under Master Plan, Only Complete Paved Road, Only Partial Paved Road,* ইত্যাদি Option-এর যে কোন ১টি Select করে শুধুমাত্র সেইসকল সড়কসমূহের Report পাওয়া সম্ভব ।
- *TotLength, CrestWidth, BCLength, HBBLength, AADT,* ইত্যাদি ঘরে Conditional Range (e.g. 2.5 AND 7.8) প্রয়োগ করে সেই অনুযায়ী Filter-কৃত Report পাওয়া সম্ভব ।

Filter Structure Data ঃ

Structure Related Report Print করার সময় উক্ত Tab Page দেখা যাবে যেখানে Road List Filter-এর মত একইভাবে Filter Option প্রয়োগ করা সম্ভব ।

Printing Report ঃ

- List থেকে যে কোন ১টি Report Select করতে হবে ।
- General Filter Tab থেকে Data-এর Location (Upazila) Select করতে হবে ।
- প্রয়োজনে Filter Option প্রয়োগ করা যাবে ।
- Plan, Scheme, Progress Related Report এর ক্ষেত্রে Project, Financial Year, ইত্যাদি Select করতে হবে ।
- **Preview** Button-টি Click করে Report-টি দেখা যাবে এবং Print করা যাবে ।

বিবিধ

Overview

- GC/Rural Market-এর Information Input করার পদ্ধতি
- UP Complex-এর Information Input করার পদ্ধতি
- Others Utility-এর Option সমূহ
- Fund Source Add/Edit করার পদ্ধতি
- Fund Allocation Add/Edit করার পদ্ধতি

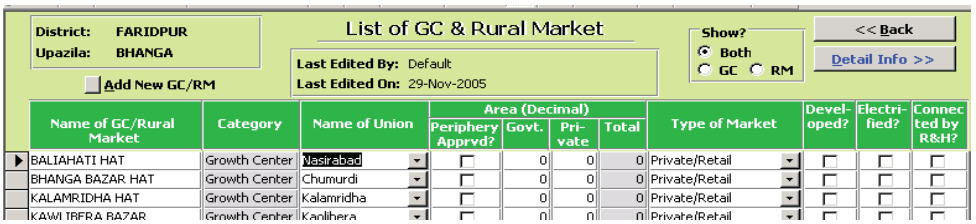
এই Module-এ আমরা GC/Rural Market, UP Complex-এর Information Input করার পদ্ধতি, Fund Source, Fund Allocation Add/Edit ইত্যাদি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

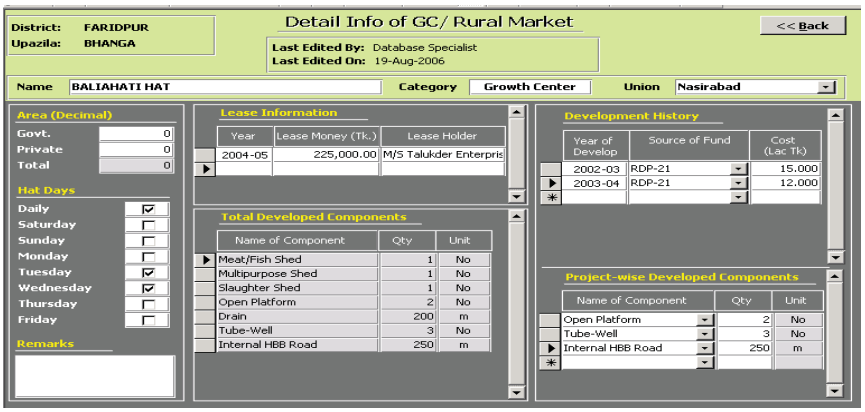
- কিভাবে GC/Rural Market -এর Information Input করা যায় ।
- কিভাবে UP Complex -এর Information Input করা যায় ।
- Others Utility-এর বিভিন্ন Option সমূহের আলোচনা ।
- কিভাবে Fund Source Add/ Edit করা যায় ।
- কিভাবে Fund Allocation Add/ Edit করা যায় ।

Information of GC/Rural Market ঃ

- প্রথমে নির্দিষ্ট উপজেলা Select করতে হবে ।
- অতঃপর Switch Board-এর "**Information of GC/Rural Market**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।

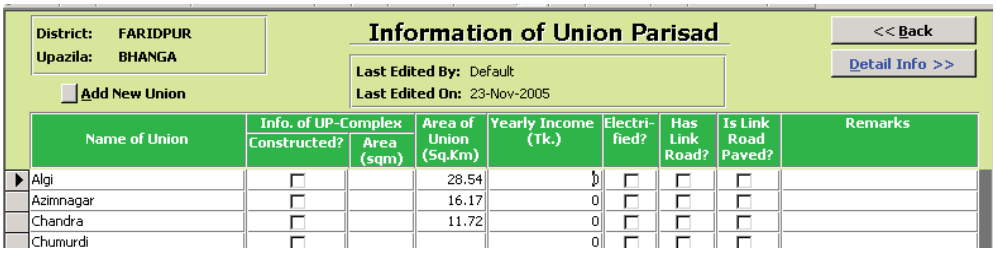


- এখানে সংশ্লিষ্ট উপজেলার Growth Center ও Rural Market সমূহের তালিকা দেখা যাবে। এখানে সকল কলামের তথ্য পূরন করতে হবে।
- অতঃপর **Detail Info** Button-টি Click করে কোন Growth Center/ Rural Market -এর বিস্তারিত তথ্য প্রদান করা যাবে । Screen টি নিম্নরূপ ঃ



Information of UP Complex ঃ

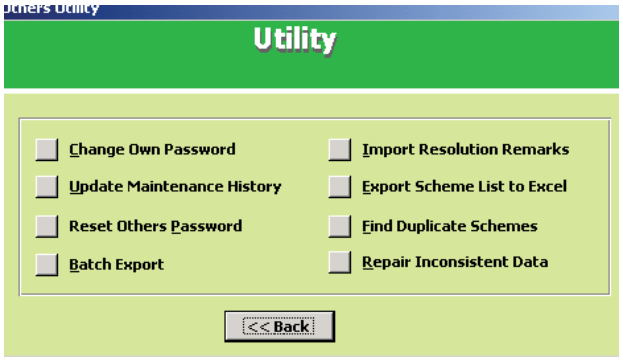
- প্রথমে নির্দিষ্ট উপজেলা Select করতে হবে ।
- অতঃপর Switch Board-এর "**Information of UP Complex**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।



- এখানে সংশ্লিষ্ট উপজেলার Union সমূহের তালিকা দেখা যাবে। এখানে সকল কলামের তথ্য পূরন করতে হবে।
- অতঃপর **Detail Info** Button-টি Click করে কোন UP Complex -এর বিস্তারিত তথ্য প্রদান করা যাবে ।

Others Utility ঃ

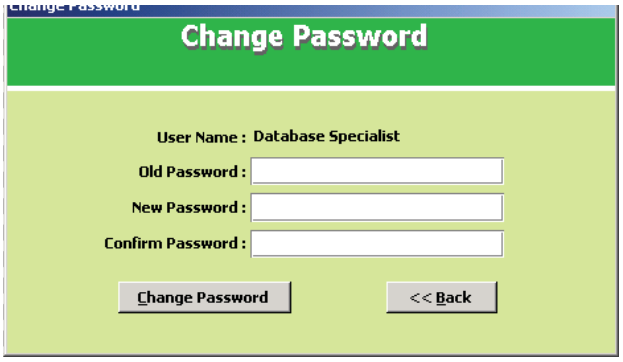
- Switch Board-এর "**Others Utility**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।



- জেলা পর্যায়ে নিম্নোক্ত Utility সমূহ ব্যবহার করা যাবে ঃ
  - Change Own Password
  - Update Maintenance History
  - Repair Inconsistent Data
  - Batch Export
  - Reset Others Password

Change Own Password

"**Change Own Password**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।



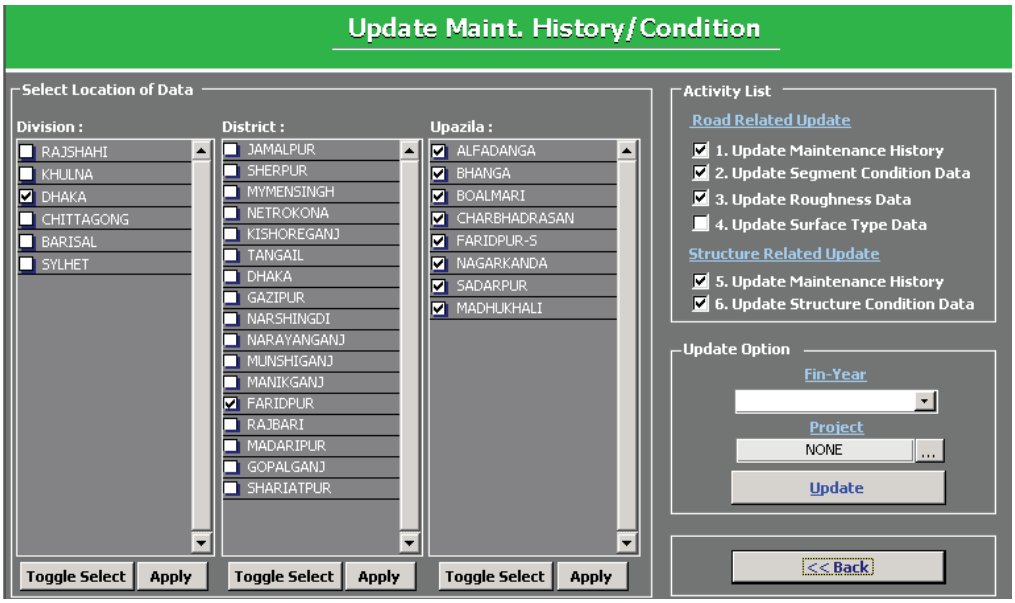
- অতঃপর **Old Password**-এর ঘরে বর্তমান Password-টি প্রদান করতে হবে। যদি বর্তমান অবস্থায় কোন Password না থাকে তাহলে উক্ত ঘরটি খালি রাখতে হবে।

- এবার **New Passowrd** এবং **Confirm Password**-এর ঘরে পছন্দ অনুযায়ী নতুন Password প্রদান করতে হবে।

- অবশেষে **Change Password** Button এ Click করলে Password-টি পরিবর্তিত হবে।

Update Maintenance History

"**Update Maintenance History**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।



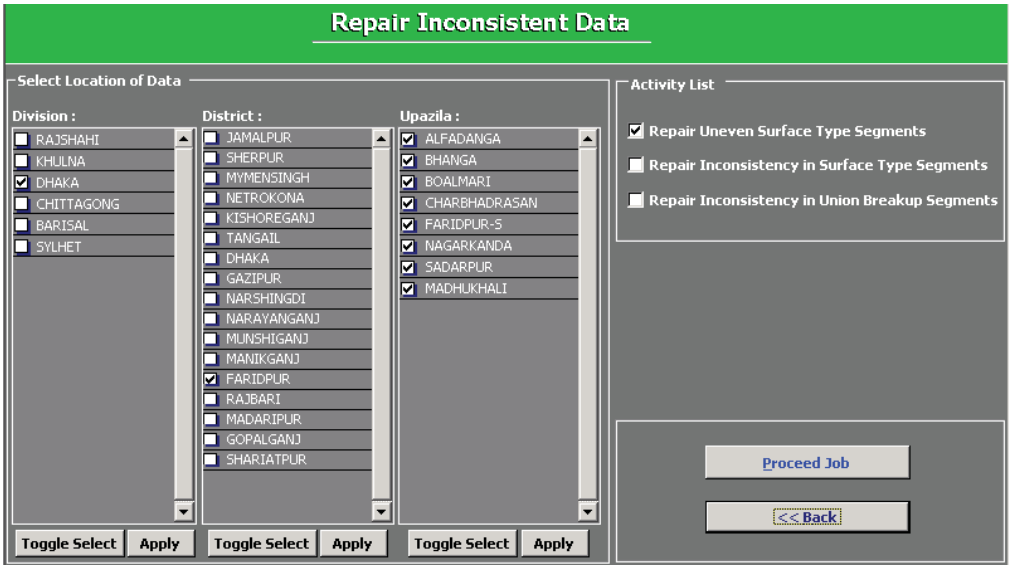
এই Utility-টির মাধ্যমে সড়ক এবং ব্রীজ/কালভার্ট-এর Maintenance History, Segment Condition, Roughness ইত্যাদি সংক্রান্ত তথ্য automatically update করা যাবে। তবে উক্ত কাজের জন্য সংশ্লিষ্ট কম্পিউটারে অবশ্যই নির্দিষ্ট অর্থবছরের জুন মাসের Closure Report থাকতে হবে।

কাজটি সম্পাদন করার লক্ষে নিম্নোক্ত প্রক্রিয়া অনুসরন করতে হবে ঃ

- "Select Location of Data" option থেকে সংশ্লিষ্ট উপজেলাসমুহ Select করতে হবে।
- "Activity List" option থেকে কোন Activity বাদ দিতে চাইলে উক্ত Activity সংলগ্ন টিক ✓ উঠিয়ে দিতে হবে।
- "Financial Year" এর ঘরে সংশ্লিষ্ট অর্থবছর (অর্থাৎ যে অর্থবছরের তথ্য দিয়ে Maintenance History, Segment Condition, Roughness ইত্যাদি সংক্রান্ত তথ্য update করা হবে) Select করতে হবে।
- "Project" এর ঘরের ডান পার্শ্বে অবস্থিত ... Button এ Click করে সংশ্লিষ্ট প্রকল্প/ প্রকল্পসমূহ (অর্থাৎ যে প্রকল্পসমূহের তথ্য দিয়ে Maintenance History, Segment Condition, Roughness ইত্যাদি সংক্রান্ত তথ্য update করা হবে) Select করতে হবে।
- অবশেষে **Update** Button এ Click করলে Software-টি উপরোল্লিখিত কাজসমূহ সম্পন্ন করবে।

Repair Inconsistent Data

"**Repair Inconsistent Data**" Button এ Click করলে নিচের Screen-টি পাওয়া যাবে।



- "Select Location of Data" option থেকে সংশ্লিষ্ট উপজেলাসমুহ Select করতে হবে।
- "Activity List" option থেকে Activity সংলগ্ন টিক ✓ দিয়ে Activity Select করতে হবে।
- অবশেষে **Proceed Job** Button এ Click করলে Software-টি Select-কৃত কাজসমূহ সম্পন্ন করবে।

Batch Export

এই Utility-টির মাধ্যমে একাধিক জেলা/উপজেলার তথ্য জেলা/উপজেলা ওয়ারী করা Export যাবে।

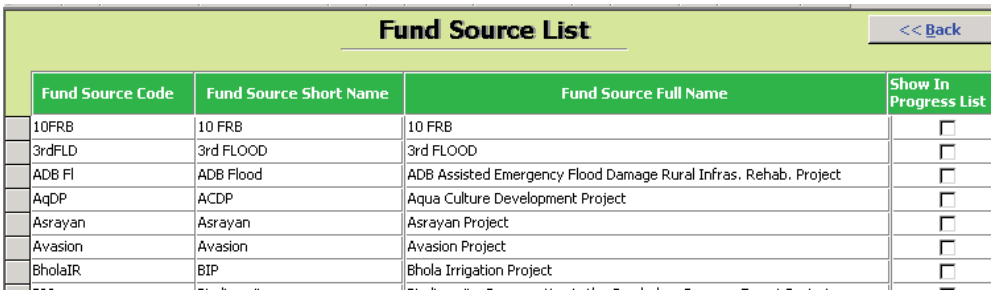
Reset Others Password

এই Utility-টির মাধ্যমে কোন RSDMS ব্যবহারকারীর Password পরিবর্তন করা যাবে। কোন RSDMS ব্যবহারকারী তার Password ভুলে গেলে এই Utility-টির মাধ্যমে সেটি আবার পরিবর্তন করা যাবে। তবে জেলা পর্যায়ে শুধুমাত্র নির্বাহী প্রকৌশলী/সহকারী প্রকৌশলী মহোদয়গণ এই Utility-টি ব্যবহার করতে পারবেন।

Fund Source List :

Road ও Structure-এর Construction/Maintenance History প্রদানের সময়, Scheme তৈরির সময় Fund Source/Project-এর নাম Select করার প্রয়োজন পড়ে ।

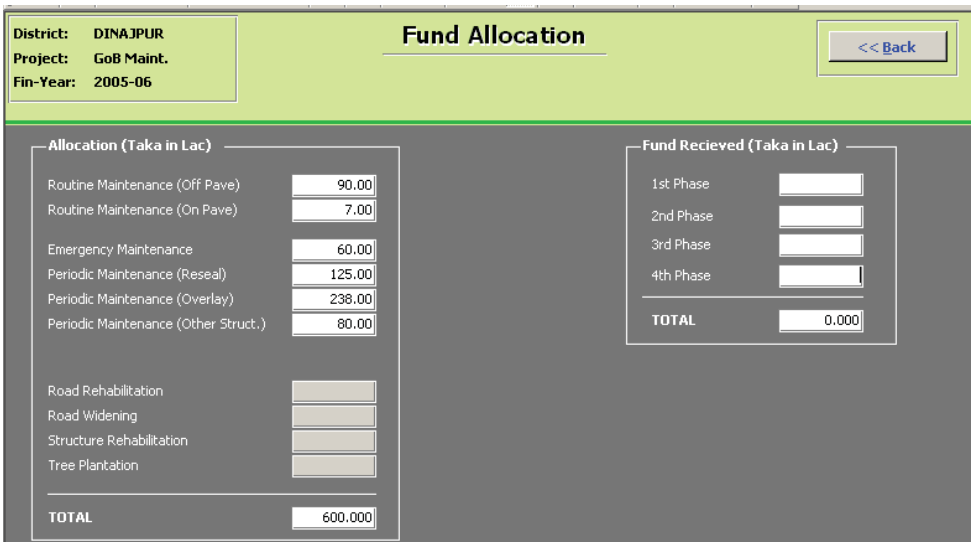
Switch Board-এর "**RSDMS**" Menu থেকে "**Fund Source List**" Sub-Menu-টি Click করে Fund Source List-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- প্রয়োজনে কোন Fund Source /Project এর নাম **Edit** করা যাবে ।
- কোন Fund Source/Project এর নাম Scheme/Progress এর List-এ না দেখতে চাইলে উক্ত Fund Source-এর বিপরীতে *Show in Progress List* কলামে টিক উঠিয়ে দিতে হবে ।

Fund Allocation :

Switch Board-এর "**RSDMS**" Menu থেকে "**Fund Allocation**" Sub-Menu-টি Click করে Fund Allocation-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- বরাদ্দ প্রাপ্তির পর প্রকল্প ও অর্থবছর অনুযায়ী বিভিন্ন খাতে প্রাপ্ত বরাদ্দের তথ্য এখানে Input করতে হবে ।
- **Add New Allocation** Button-টি Click করে এক এক করে বিভিন্ন অর্থবছরের Allocation Input করা যাবে ।

RSEPS

Introduction

এলজিইডি কর্তৃক গৃহিত বিভিন্ন উন্নয়ণমূলক কাজ সুষ্ঠুভাবে বাস্তবায়নের লক্ষ্যে কাজের বিভিন্ন আইটেম (Item of Work) সমূহকে Standardization এবং একক দর বিশ্লেষণ (Unit Cost Analysis) করা হয়েছে । যে কোন Item of Work এর দরের Unit Cost Analysis-এর জন্য ঐ Item of Work এ ব্যবহৃত Basic Material (যেমন ঃ ইট, সিমেন্ট, বালি, শ্রমিক, ইত্যাদি) এর পরিমান ও তাদের বাজার দর এবং সরকার কর্তৃক নির্ধারিত VAT, IT ব্যবহার করা হয়ে থাকে ।

Basic Material সমূহের বাজার দরের মূল্য হ্রাস/বৃদ্ধির সাথে Item of Work এর দরের সমন্বয় রাখার জন্য প্রায় প্রতি বছর এলজিইডির সদর দপ্তর হতে Unit Cost Analysis ব্যবহার করে প্রতিটি Item of Work এর জন্যই ১৭টি জোন অনুযায়ী আলাদা আলাদা দর নির্ধারন করা হয়ে থাকে । এছাড়া এলজিইডির সদর দপ্তর, জেলা ও উপজেলা অফিস সমূহে প্রতিনিয়ত নির্মান/ মেরামত কাজের প্রচুর প্রাক্কলন (Estimate), সংশোধিত প্রাক্কলন (Revise Estimate), কাজের সিডিউল (Schedule of Works) তৈরি করতে হয় এবং দরপত্র দাতাদের দরপত্র সমূহ মূল্যায়ন করতে হয় । উল্লেখিত কার্যক্রমের ধরন থেকেই প্রতিয়মান হয় যে, কাজগুলি Manually সম্পাদন করা অত্যন্ত কঠিন, শ্রমসাধ্য ও সময় সাপেক্ষ ব্যাপার । তদুপরি ভুলের সম্ভাবনাও থাকে প্রতিনিয়ত ।

উপরোক্ত কাজসমূহ নির্ভূলভাবে সম্পাদন, সহজতর করা এবং সদর দপ্তর, জেলা ও উপজেলা পর্যায়ের এলজিইডির অফিসে কম্পিউটার ব্যবহার সম্প্রসারনের লক্ষ্যে Rate Schedule & Estimate Preparation System (RSEPS) নামক Software টি প্রস্তুত করা হয়েছে । উক্ত Software টি ব্যবহার করে খুব সহজে, নির্ভুলভাবে এবং সময় সাশ্রয় করে Schedule of Rates হালনাগাদকরন, Rate Analysis তৈরি, কাজের প্রাক্কলন (Estimate), সংশোধিত প্রাক্কলন (Revise Estimate), সিডিউল (Schedule of Works) তৈরি, দরপত্র দাতাদের দরপত্র সমূহ মূল্যায়ন ইত্যাদি কাজ করা সম্ভব ।

Technical Specification

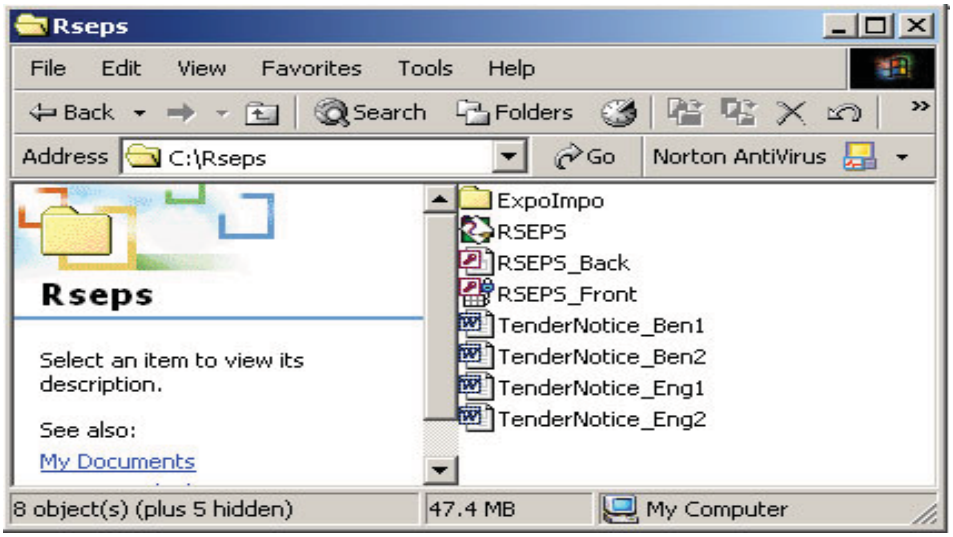
RSEPS Software টি Microsoft Access Database এবং Visual Basic for Application এর সমন্বয়ে তৈরি করা হয়েছে । Software টিতে তথ্য/উপাত্তসমুহ সংরক্ষণের জন্য ১টি Database File (RSEPS_Back.MDB) এবং উক্ত Database File টিকে Link করে কার্য সম্পাদনের জন্য ১টি আলাদা Interface (RSEPS_Front.MDE) তৈরি করা হয়েছে । যার ফলে Software টি Client-Server environment এ ব্যবহার করা সম্ভব । Software ব্যবহার করার জন্য নিম্নলিখিত Software/ Hardware environment প্রয়োজন ঃ

- Software environment:
  Operating System (OS): Windows family
  (Windows 95/98, Windows NT, Windows 2000/ XP)

  Application Software : MS Access 97/2000

- Hardware environment:
  CPU : Pentium-I or above
  RAM : 64 MB or above (depending on OS)

RSEPS Software এ ব্যবহৃত File-গুলি C Drive এ RSEPS নামক Folder এর ভেতর থাকতে হবে । অন্যথায় Software টি Run করবে না ।



সরবরাহকৃত CD-টিতে RSEPS_YourZone (যেমনঃ RSEPS_Dhaka) নামে Folder-টির ভিতরে **RSEPS_97** ও **RSEPS_2K** নামে ২টি Folder দেখতে পাবেন

- আপনার Microsoft Office-এর Version 97 হলে **RSEPS_97** Folder-টি copy করুন অথবা Microsoft Office এর Version 2000 হলে **RSEPS_2K** Folder-টি copy করুন এবং C Drive-এ Paste করুন। এবার **RSEPS_97/RSEPS_2k** Folder-টিকে **RSEPS** নামে **Rename** করুন
- এবার Folder-টির ভিতরের সবকটি File Select করে Mouse এর Right button চেপে Properties এ যান এবং Attributes: Read Only এর Tick তুলে দিয়ে Archive এ Tick দিন ।
- RSEPS_Front.MDE File-টি Double Click করে Program -টি Run করুন ।

▶▶ প্রয়োজনে নিম্নলিখিত পদ্ধতিতে Desktop-এ Software-টির Short-cut তৈরি করা যেতে পারে যেখান থেকে সহজেই Software-টি Run করা যাবে ।

- **RSEPS_Front.MDE** File-টিতে Mouse এর Right Button Click করুন ।
- এবার **Send To >> Desktop** (create shortcut) Icon-টিতে Click করুন ।
- দেখা যাবে Desktop-এ Software-টির Short-cut তৈরি হয়ে গেছে ।

Note : RSEPS Software এ ব্যবহৃত File-গুলি C Drive এ RSEPS নামক Folder এর ভেতর থাকতে হবে । অন্যথায় Software টি Run করবে না ।

Switch-Board, Menu Bar এবং Common Command Button এর ব্যবহার পদ্ধতি

Overview

- Switch Board এর কার্যকারিতা
- Menu Bar এর কার্যকারিতা
- Command Button এর কার্যকারিতা
- Hot Key এবং তার ব্যবহারিতা

Software টির সকল কার্যক্রম Switch-Board, Menu Bar এবং কিছু Command Button এর মাধ্যমে পরিচালিত হয় । কাজেই Software টি পরিচালনা করতে হলে উপরোক্ত বিষয়ের ব্যবহার পদ্ধতি জানা আবশ্যক । এই Module এ আমরা Switch-Board, Menu Bar এবং সচরাচর ব্যবহৃত Command Button নিয়ে আলোচনা করবো ।

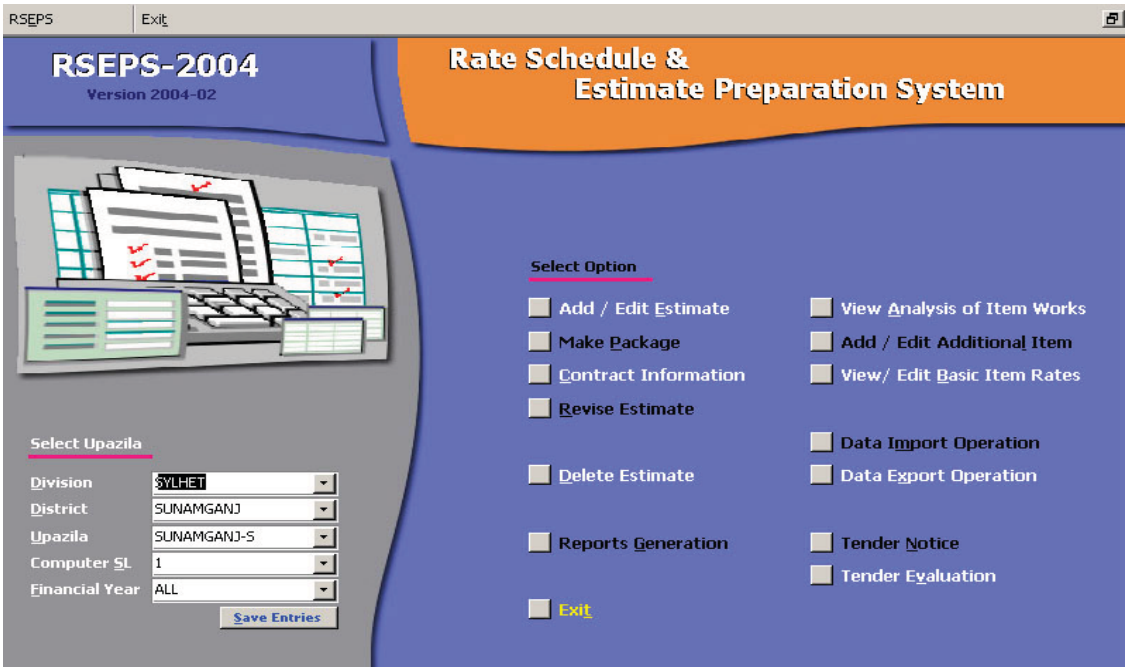
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Switch-Board এর কোন Button চেপে কোন ধরনের কাজ করা যায় ।
- Menu Bar এর কোন Menu Select করে কোন ধরনের কাজ করা যায় ।
- কোন Command Button কখন ব্যবহার করতে হয় ।

এবং

- Hot Key বলতে কি বুঝায় এবং তা ব্যবহার করে কিভাবে কাজ দ্রুততর করা যায় ।

■ Switchboard:



উপরের ছবিতে আমরা Software টির Switch Board এর ছবি দেখতে পাচ্ছি । Software টি Run করলে প্রথমেই উক্ত Switch Board-টি আসবে এবং Software টির সকল কার্যক্রম উক্ত Switch Board এর মাধ্যমে পরিচালিত হয়ে থাকে ।

⊡ Upazila Selection:

Switch Board এর বামদিকে **Upazila Selection** এর Option দেখা যাচ্ছে । এই Selection এর মাধ্যমে নির্দিষ্ট উপজেলার Estimate তৈরিসহ অন্যান্য কার্যক্রম পরিচালনা করা যাবে ।

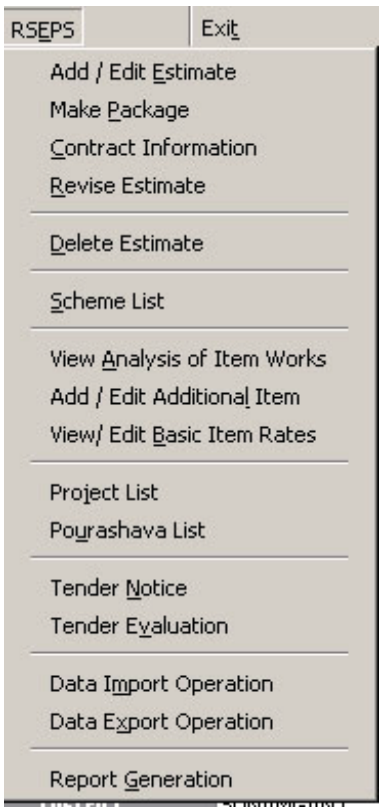
প্রার্থিত উপজেলা Selection এর জন্য প্রথমে Division List থেকে নির্দিষ্ট Division Select করতে হবে । এখন শুধুমাত্র Select কৃত Division এর District সমূহ District List এ দেখা যাবে। এখন District List থেকে নির্দিষ্ট District Select করতে হবে। এখন শুধুমাত্র Select কৃত District এর Upazila সমূহ Upazila List এ দেখা যাবে। এখন Upazila List থেকে প্রার্থিত Upazila Select করতে হবে । **Save Entries** button-টি Click করে উক্ত Selection Save করে রাখা যাবে ।

এখানে Upazila Selection এর পাশাপাশি Computer SL Selection করতে হয় যা ১টি Estimate এর Unique *Scheme Code* Generate এর জন্য প্রয়োজন । Scheme Code নিয়ে পরবর্তীতে আলোচনা করা হবে । এখানে Financial Year Selection এর মাধ্যমে নির্দিষ্ট Financial Year এর Estimate Filter করে দেখা যাবে ।

⊡ Select Option:

- **Add/ Edit Estimate**
  Estimate তৈরি/ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Make Package**
  Package তৈরি/ পরিবর্তন সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Contract Information**
  কোন Scheme/Package এর Contract হয়ে গেলে Tenderer এর দর সংক্রান্ত তথ্য Input করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Revise Estimate**
  কোন Estimate এর Revise করার প্রয়োজন হলে উক্ত Button-টি ব্যবহার করতে হবে ।
- **Delete Estimate**
  কিছু Selected Estimate মুছে ফেলার প্রয়োজন হলে উক্ত Button-টি ব্যবহার করতে হবে ।
- **View Analysis of Item of Works**
  কোন Item of Work এর Analysis (Basic Material & Quantity) দ্রুত দেখার প্রয়োজন হলে উক্ত Button-টি ব্যবহার করতে হবে ।
- **Add/ Edit Additional Item**
  LGED এর Schedule of Works বর্হিভূত কোন Item দ্বারা Estimate করার প্রয়োজন হলে উক্ত Button-টি ব্যবহার করে সেই Item-টি তৈরি করা যাবে ।
- **View/ Edit Basic Item Rate**
  Basic Item সমূহের দর দেখা এবং প্রয়োজনে দর প্রস্তাব করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Data Import Operation**
  Estimate, Basic Item Rate ইত্যাদি তথ্য Import করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Data Export Operation**
  Estimate, Basic Item Rate ইত্যাদি তথ্য Export করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Tender Notice**
  Tender Notice তৈরি করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Tender Evaluation**
  Tender Evaluation সংক্রান্ত কাজের জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Report Generation**
  বিভিন্ন ধরনের Report দেখার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Exit**
  উক্ত Button-টি ব্যবহার করে RSEPS Program থেকে বের হওয়া যাবে ।

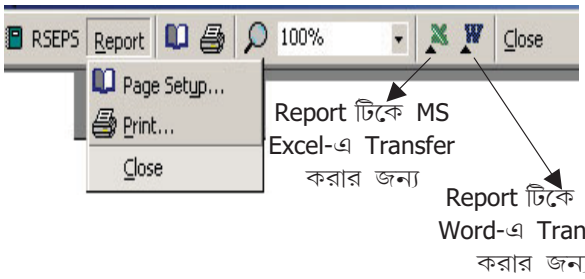
■ Menu Bar:



⏩ Main Menu :

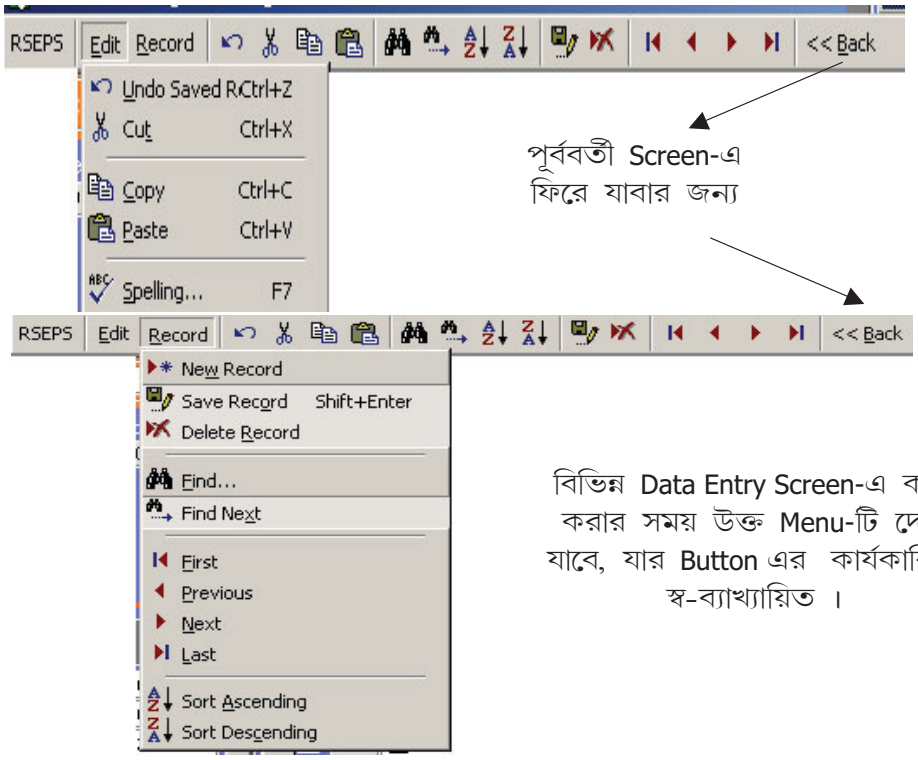
বাম পাশের ছবির Menu-টি Main Menu । Switch Board এর সকল Button এর কার্যক্রম এই Menu থেকেই পরিচালনা করা যায় উপরোক্ত « **Project List** » ও « **Pourashava List** » এখান থেকে দেখা যায় এবং প্রয়োজনে সেই List Add/Edit করা যায় ।

⏩ Report Menu :



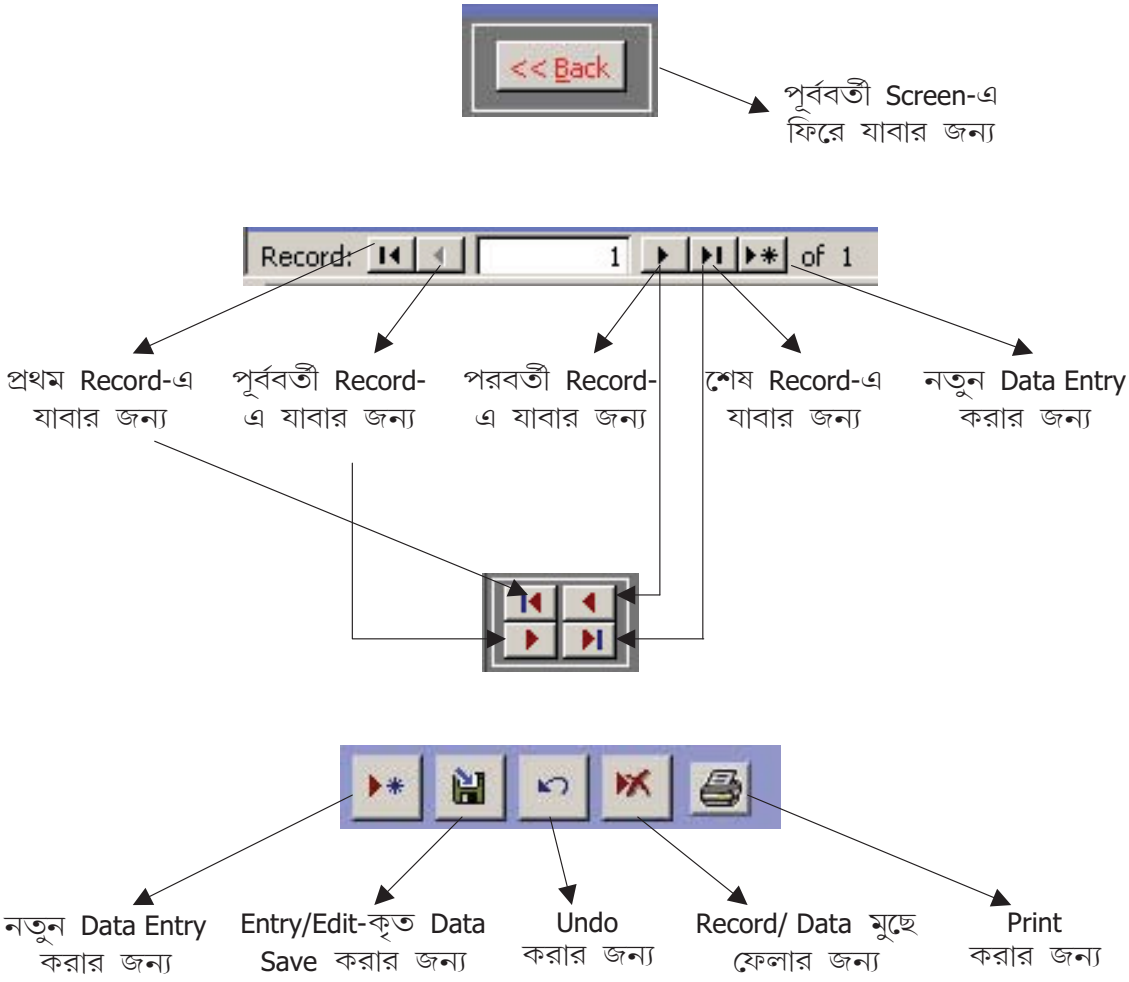
যে কোন Report Preview এর সময় উক্ত Menu-টি দেখা যাবে, যার Button এর কার্যকারিতা স্ব-ব্যাখ্যায়িত।

⏩ Data Add/Edit সংক্রান্ত Menu :



বিভিন্ন Data Entry Screen-এ কাজ করার সময় উক্ত Menu-টি দেখা যাবে, যার Button এর কার্যকারিতা স্ব-ব্যাখ্যায়িত ।

■ Common Command Button এর ব্যবহার ঃ



■ Hot Key এবং তার ব্যবহারিতা ঃ

MS Windows এবং তার Environment-এ ব্যবহৃত বিভিন্ন Application Software-এর অধিকাংশ Menu/Sub Menu/ Button এর Caption এর কোন একটি অক্ষরের নিচে Underline করা থাকে (যেমন ঃ File Menu-এর ক্ষেত্রে F) । Mouse-এর ব্যবহার না করে ALT+ সেই অক্ষর ব্যবহার করে (যেমন ঃ **File Menu**-এর ক্ষেত্রে **ALT+F**) Keyboard এর সাহায্যে Data Entry সংক্রান্ত কাজ দ্রুততর করা যায় । একেই Hot Key বলে ।

RSEPS Software-এর অধিকাংশ Menu/Sub Menu/ Button এ Hot Key সংযোজন করা হয়েছে যেমন ঃ উপরোক্ত "**Back**" button-এর ক্ষেত্রে **B** (অর্থাৎ **ALT+B**), Switch Board-এর "**Add/ Edit Estimate**" button-এর ক্ষেত্রে **E** (অর্থাৎ **ALT+E**) । একইভাবে অন্যান্য ক্ষেত্রেও এই পদ্ধতি ব্যবহার করে Data Entry সংক্রান্ত কাজ দ্রুততর করা যেতে পারে ।

Estimate প্রস্তুত/ সংশোধন ও Print করার পদ্ধতি

Overview

- Scheme Code এর Format
- Estimate তৈরির পদ্ধতি
- Estimate এ Item, Item-এর বিস্তারিত পরিমাপ, Break-up Input করার পদ্ধতি
- একটি Item-এর বিস্তারিত পরিমাপ অন্য Item-এ Copy/Paste করার পদ্ধতি
- Salvage Entry করার পদ্ধতি
- Estimate Print করা, খুঁজে বের করা, Copy/Paste করার পদ্ধতি

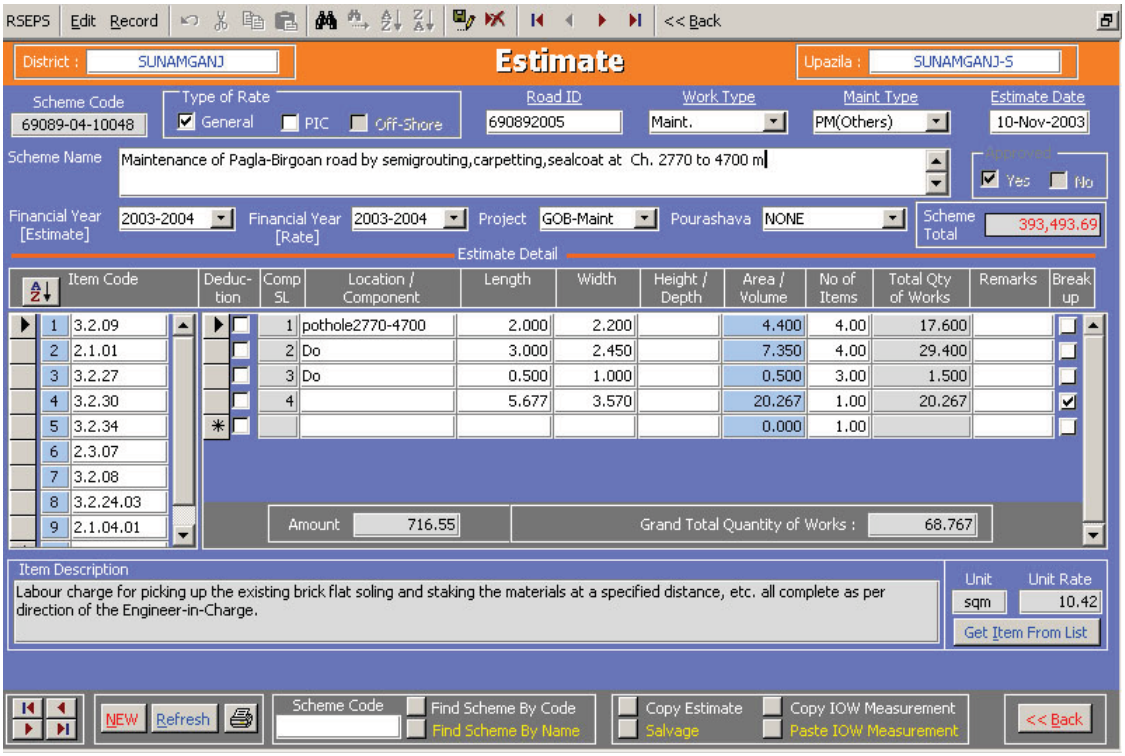
এই Module-এ আমরা RSEPS Software ব্যবহার করে সহজে **Estimat** তৈরি করার বিভিন্ন পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Estimate এর Scheme Code কোন Format-এ Automatically তৈরি হয় ।
- কিভাবে সহজে Estimate তৈরি করা যায় ।
- কিভাবে Estimate এ Item, Item-এর বিস্তারিত পরিমাপ, Break-up Input করতে হয় ।
- Scheme- এ কোন Salvage Material কিভাবে তার Data Input করতে হয় ।
- একটি Item-এর বিস্তারিত পরিমাপ কিভাবে অন্য Item-এ Copy/Paste করা যায় ।
- Estimate তৈরি করার পর কিভাবে তা Print করা যায়, অথবা পূর্বে তৈরিকৃত Estimate কিভাবে খুঁজে বের করা সম্ভব ।
- এবং Estimate তৈরি সংক্রান্ত অন্যান্য খুটিনাটি বিষয়সমূহ ।

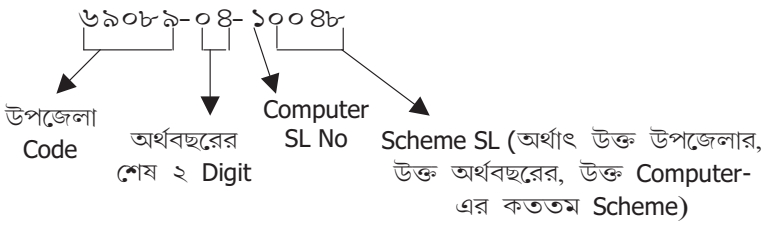
■ Estimate:

পূর্ববর্তী Module থেকে আমরা জানতে পেরেছি যে, Estimate তৈরি/ পরিবর্তন সংক্রান্ত কাজের জন্য Switch Board-এর "Add/Edit Estimate" Button-টি Click করতে হয় । Button-টি Click করলে নিম্নোক্ত Screen-টি দেখা যাবে, যেখানে Estimate সংক্রান্ত কাজ সম্পাদন করা যাবে ।



▸▸ Scheme Code:

RSEPS Software-এর মাধ্যমে Estimate তৈরির সময় Software টি প্রতিটি Estimate-এর জন্য Automatically ১টি Unique Scheme Code তৈরি করে, যা নিম্নরূপ ঃ



Note : ১টি উপজেলায় একাধিক Computer ব্যবহার করে Estimate তৈরির প্রয়োজন হলে Computer SL No যথাক্রমে ১,২,৩. . . করে দিতে হবে ।

⏩ নতুন Estimate প্রস্তুত :

Estimate তৈরির Screen টির নিচের দিকে অনেকগুলি Button রয়েছে, তন্মধ্যে 

Button টি Click করে ১টি নতুন Estimate তৈরির কাজ শুরু করা যাবে । অতঃপর Type of Rate, RoadID, Work Type, Maint. Type, Estimate Date, Scheme Name, Financial Year (Estimate), Financial Year (Rate), Project, Pourashava ঘরগুলি পুরন করে Item of Work-এর কোড (যেমন ঃ ২.১.০৪.০১) Input এবং Item টির Detailed Measurement প্রদান করতে হবে, যা নিয়ে নিম্নে বিস্তারিত আলোচনা করা হলো ঃ

Type of Rate:

এখানে General, PIC এবং Off-Shore এই ৩ ধরনের Option দেখা যাচ্ছে, Default ভাবে General-এ টিক দেওয়া থাকে । Project Implementation Committee এর Estimate করতে চাইলে PIC-তে টিক দিতে হবে অথবা Off-shore Island-এর Estimate করতে চাইলে Off-Shore-এ টিক দিতে হবে । এই Selection এর উপর ভিত্তি করেই Software-টি Estimate-এ ব্যবহৃত Item গুলির দর নির্ধারন করবে ।

Road ID:

যে Estimate-টি তৈরি করা হচ্ছে সেটি যদি কোন Road/Structure এর Estimate হয় তাহলে সেই Road/Structure এর Road Code Input করতে হবে ।

Work Type:

এখানে Estimate-টির কাজের ধরন (যেমন ঃ Construction, Rehabilitation, Maintenance, ইত্যাদি) Select করতে হবে ।

Maint. Type:

Work Type যদি Maintenance হয় সেক্ষেত্রে এখানে Maintenance এর Type Select করতে হবে ।

Estimate Date:

এখানে Estimate-টি তৈরির তারিখ Input করতে হবে ।

Scheme Name:

এখানে Scheme-টির নাম Input করতে হবে ।

Financial Year (Estimate):

এখানে Scheme-টির অর্থবছর Select করতে হবে ।

Financial Year (Rate):

যে অর্থবছরের দর ব্যবহার করে Estimate-টি তৈরি করতে ইচ্ছুক এখানে সেই অর্থবছরটি Select করতে হবে ।

Note : যে সকল জেলায় Off-shore Island আছে শুধুমাত্র সেই সকল জেলার ক্ষেত্রে Off-shore Option-টি Enable হবে ।

Project:

যে Project-এর মাধ্যমে Scheme-টি বাস্তবায়িত হবে এখানে সেই Project-এর নাম Select করতে হবে । যদি কোন Project-এর নাম এই List এ না থাকে সেক্ষেত্রে Project-এর নাম Add করে নিতে হবে । Project Add/Edit করার পদ্ধতি নিয়ে Module: 10, বিবিধ-তে আলোচনা করা হবে ।

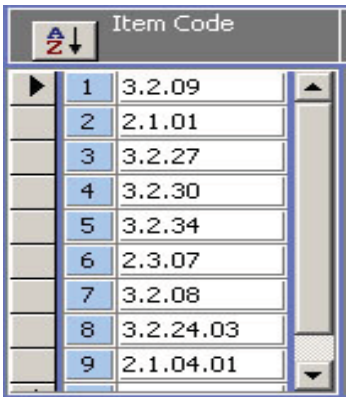
Pourashava:

Scheme-টি যদি কোন Pourashava-এর হয়ে থাকে সেইক্ষেত্রে এখানে সেই Pourashava-এর নাম Select করতে হবে । যদি কোন Pourashava-এর নাম এই List-এ না থাকে সেক্ষেত্রে Pourashava-এর নাম Add করে নিতে হবে । Pourashava Add/Edit করার পদ্ধতি নিয়ে Module: 10, বিবিধ-তে আলোচনা করা হবে ।

▸▸ Item Code ও তার Detailed Measurement:

এখন Estimate-এ ব্যবহৃত Item সমূহের কোড "Item Code" - এর ঘরে Input করতে হবে এবং তার Detailed Measurement প্রদান করতে হবে ।

Item Code Input করার সাথে সাথে তার Description, Unit এবং Select-কৃত অর্থবছর অনুযায়ী Unit Rate Screen-এর নিচের দিকে দেখা যাবে ।



- **Item Code Re-Sorting:**
  অধিকাংশ সময় Item গুলিকে কাজের ধারাবাহিকতা অনুযায়ী Input করা হয়ে থাকে যাতে করে Estimate-টি সহজবোধ্য হয় ।

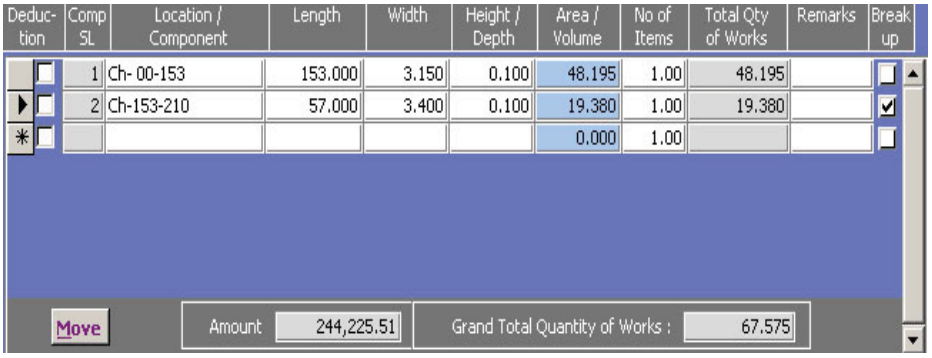
  Item গুলি Input করার সময় তার বাদিকের কলামের SL No-টি Automatically Generate হতে থাকে ।

- **Item Code Re-Sorting:**
  মনেকরি ভুলবশতঃ ১টি Item ধারাবাহিকভাবে Input করা হয়নি । উদাহরনস্বরূপ ঃ উপরোক্ত চিত্রের "**2.1.04.01**" Item-টি ৯ নম্বর SL-এর পরিবর্তে ৩ নম্বর SL-এ হওয়া উচিত ছিল কিন্তু ভুলবশতঃ তা করা হয়নি । এরকম পরিস্থিতিতে "**2.1.04.01**" Item-টির SL নম্বর টির ঘরে ৩ টাইপ করতে হবে, অতঃপর  Button-টি Click করলে দেখা যাবে Item গুলি Re-sorting হয়ে গেছে ।

Note : ▶ চিহ্ন দ্বারা বোঝায় যে, উক্ত Row-টি এই মুহূর্তে Selected আছে ।

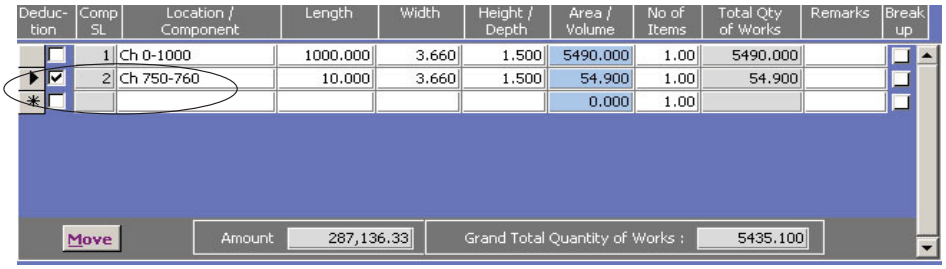
- **Item এর Detailed Measurement:**

  Item Code (যদি Item টির Unit Lumpsum না হয়) এর ডান পাশে নিম্নোক্ত Screen-টি দেখা যায়, যেখানে এর Detailed Measurement (Description, Length, Width, Height, ইত্যাদি) প্রদান করা যাবে ।



  প্রয়োজনে Length, Width, Height না দিয়ে শুধু Area/ Volume প্রদান করা যাবে, যেমন ঃ রড-এর ক্ষেত্রে Area/ Volume এর ঘরে শুধু তার পরিমান Input করা যাবে ।

- **Deduction:**



  মনেকরি চেইনেজ ০ থেকে ১০০০ পর্যন্ত ১ কিমি রাস্তার মাটি ভরাটের কাজ হচ্ছে যেখানে ৭৫০ চেইনেজে ১০মি লম্বা ১টি ব্রীজ আছে । এরকম ক্ষেত্রে উপরোক্তভাবে Measurement প্রদান করা যেতে পারে ।

- **Component Re-Sorting:**

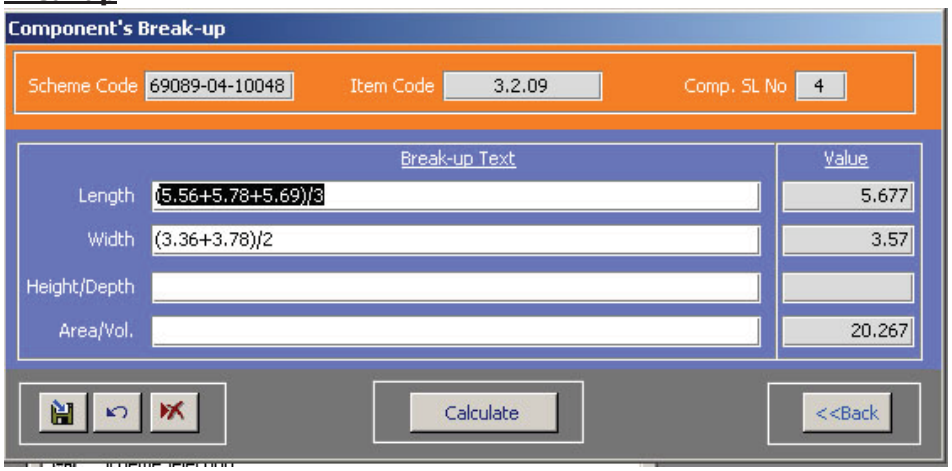
  Item Code এর মত তার Component/Locationগুলিও ধারাবাহিকভাবে বর্ণনা করা হয়ে থাকে । এখানে Component SL No-টি Automatically Generate হতে থাকে ।

  মনেকরি ১টি রাস্তার ০-৫০০, ৫৫০-৮০০, ৯০০-১২২০ চেইনেজের Measurement Input করতে গিয়ে ভুলবশতঃ ৫৫০-৮০০ চেইনেজের Measurement Input করা হয়নি । এখন ৫৫০-৮০০ চেইনেজের Measurement Input করতে গেলে তা ৯০০-১২২০ চেইনেজের পরে Input করতে হচ্ছে ।

  এইরকম ক্ষেত্রে Data Input করার পর 

Button-টি Click করতে হবে। অতঃপর যেখানে Move করাতে ইচ্ছুক সেই নম্বরটি (এইক্ষেত্রে ২) প্রদান করে OK Button-টি Click করতে হবে ।

- **Breakup:**



কিছুক্ষেত্রে Estimate-এ উপরোক্তভাবে Measurement এর Break-up প্রদান করতে হয় ।

সেইক্ষেত্রে Break-up Button-টি Click করলে উপরোক্ত Screen টি আসবে । এখানে Break-up প্রদান করা যেতে পারে । উল্লেখ্য এখানে Break-up Text হিসাবে যে কোন ধরনের Arithmetic Formula লিখা যাবে । অতঃপর **Calculate** Button-টি Click করলে Software-টি নিজেই এর Value বের করবে।

এখন **Save** Button-টি Click করে **Back** করতে হবে ।

Note :	Estimate তৈরির Screen-এ শুধুমাত্র Measurement এর Value দেখা যাবে কিন্তু Estimate-টি Print করলে Break-up দেখা যাবে ।

- **Lumpsum Item:**

কোন Item এর Unit যদি Lumpsum (LS) হয় সেক্ষেত্রে Measurement এর Screen টি নিম্নরূপ হবে ।

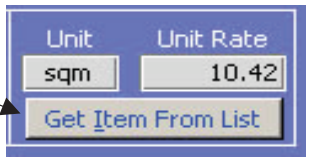
LS Amount (Per Item)	No. Of Item	TOTAL LS Amount
5000.00	1	5000.00

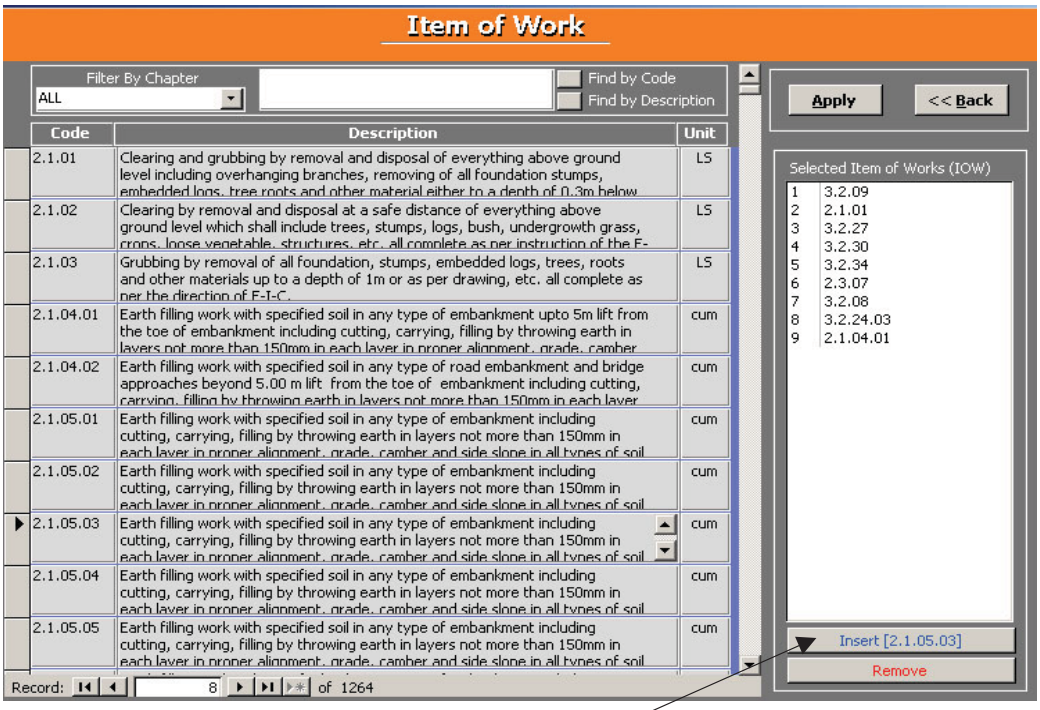
এখানে Item-টির Lumpsum Amount ও একাধিক Number of Item Input করতে হবে ।

⏩ List থেকে Item Code আনয়ন :

প্রয়োজনবোধে Item Code Type না করে List থেকে সেগুলি Estimate-এ আনয়ন করা যাবে ।

এজন্য **Get Item From List** Button-টি Click করলে নিম্নোক্ত Screen টি আসবে ।





এখন যে কোন Item-কে Select করে **Insert** [....] Button-এ Click করে অথবা Item Code/Description/Unit এর যে কোন ঘরে Double Click করে সেটিকে পার্শ্ববর্তী List (Selected Item of Works)-এ নিয়ে যাওয়া যাবে ।

এভাবে Estimate-এর জন্য প্রয়োজনীয় সকল Item-কে Selected Item of Works List-এ নিয়ে যাওয়ার পর **Apply** Button-টি Click করলে Item-গুলি Estimate-এ চলে যাবে ।

Note :

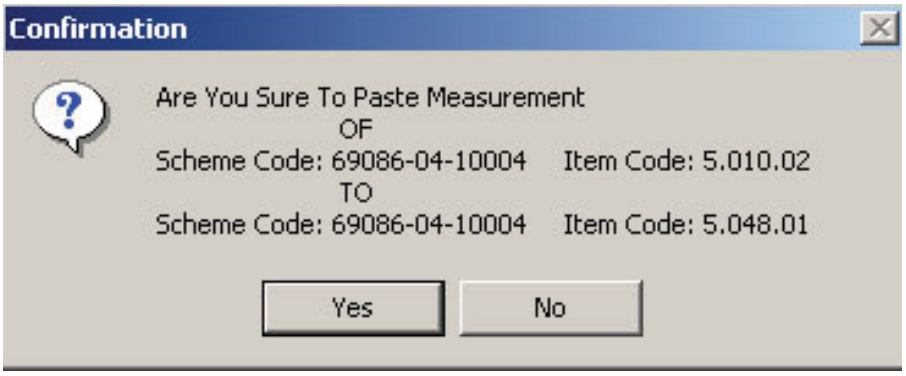
- **Filter by Chapter** এর মাধ্যমে নির্দিষ্ট Chapter-এর Item সমূহ Filter করা যেতে পারে ।
- Find Button এর পার্শ্ববর্তী ঘরে Item Code/ Partial Description লিখে **Item-টি খুঁজে বের করা যেতে পারে** ।
- Selected Item of Works List-থেকে কোন Item **মুছতে হলে** Item-টি Select করে **Remove** Button-টি Click করতে হবে ।

⏩ Item of Works এর Measurement Copy/Paste করা :

অনেক সময় একই কাজের জন্য একাধিক Item ব্যবহার করা হয়ে থাকে (যেমনঃ রাস্তার একই অংশে Tack Coat ও Seal Coat), যার Detailed Measurement সাধারণতঃ একই হয়ে থাকে ।

- এরকম ক্ষেত্রে প্রথমে যে Item-টির Measurement Copy করতে ইচ্ছুক সেটিকে Select করতে হবে ।
- এবার **Copy IOW Measurement** Button-টি Click করতে হবে ।
- এবার যে Item-টিতে Measurement Paste করতে ইচ্ছুক সেটিকে Select করতে হবে এবং **Paste IOW Measurement** Button-টি Click করতে হবে।

- এবার Software-টি নিম্নোক্তভাবে Confirmation চাইবে, এখন **YES** Button-টি Click করলে Copy-কৃত Measurement Selected Item- এ Paste হয়ে যাবে ।



এভাবে যে কোন Item এর Measurement একই Estimate অথবা অন্য Estimate-এর কোন Item এ Copy/Paste করা যেতে পারে ।

⏩ Salvage Material এর Data Entry করা :

যে Scheme টির জন্য Estimate প্রস্তুত করা হচ্ছে সেটিতে যদি কোন Salvage Material থাকে, সেক্ষেত্রে নিম্নোক্তভাবে তার Data Entry করতে হবে ।

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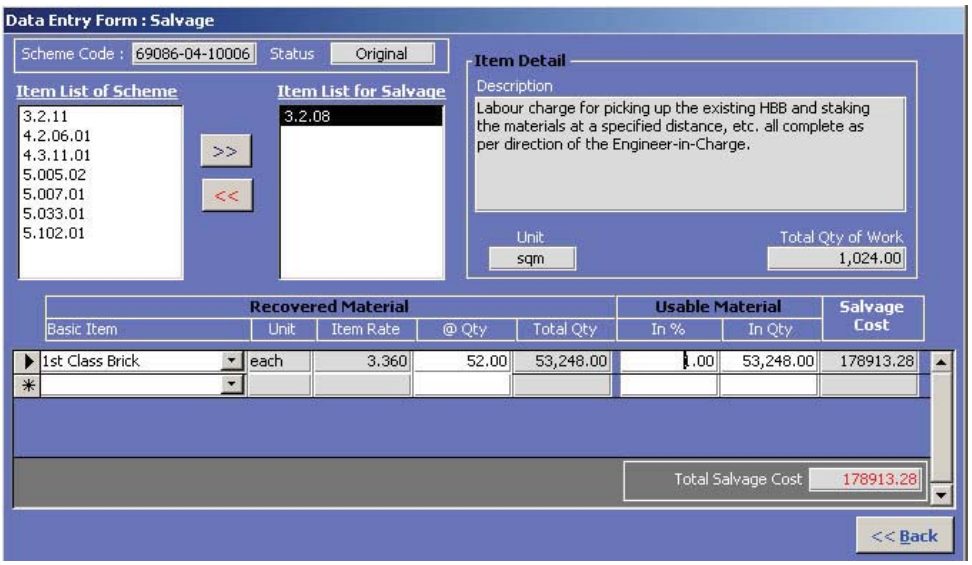
Button-টি Click করলে নিম্নোক্ত Screen টি আসবে ।



- এখানে ২টি List দেখা যাচ্ছে । **Item List of Scheme**-এ Estimate-এ ব্যবহৃত সকল Item এবং **Item List for Salvage**-এ Salvage-এর জন্য Select-কৃত Item সমূহ দেখা যায় ।
- এখন Item List of Scheme থেকে যে Item-টির Salvage আছে সেটিকে Select করে [>>] Button-টি Click করে Item List for Salvage এ নিয়ে যেতে হবে । (যেমন ঃ উপরোক্ত Screen-এ 3.2.08 (Picking up of HBB) Item-টিতে Salvage Material আছে বিধায় সেটিকে Salvage List নেওয়া হয়েছে) ।
- এখন Item List for Salvage থেকে নির্দিষ্ট Item-টি Select করে Basic Item List থেকে Recovered Material-টি Select করতে হবে এবং @Qty ঘরে Item-টির Unit প্রতি Recoverable Quantity বসাতে হবে (যেমন ঃ HBB-এর ক্ষেত্রে প্রতি Sqm-এ ৫২টি করে ইট পাওয়া যেতে পারে) ।
- এখন Usable Material কলামে Material-টির Usable পরিমান বসাতে হবে, যা In% অথবা In Qty-এর যে কোন ১টিতে বসালেই হবে ।

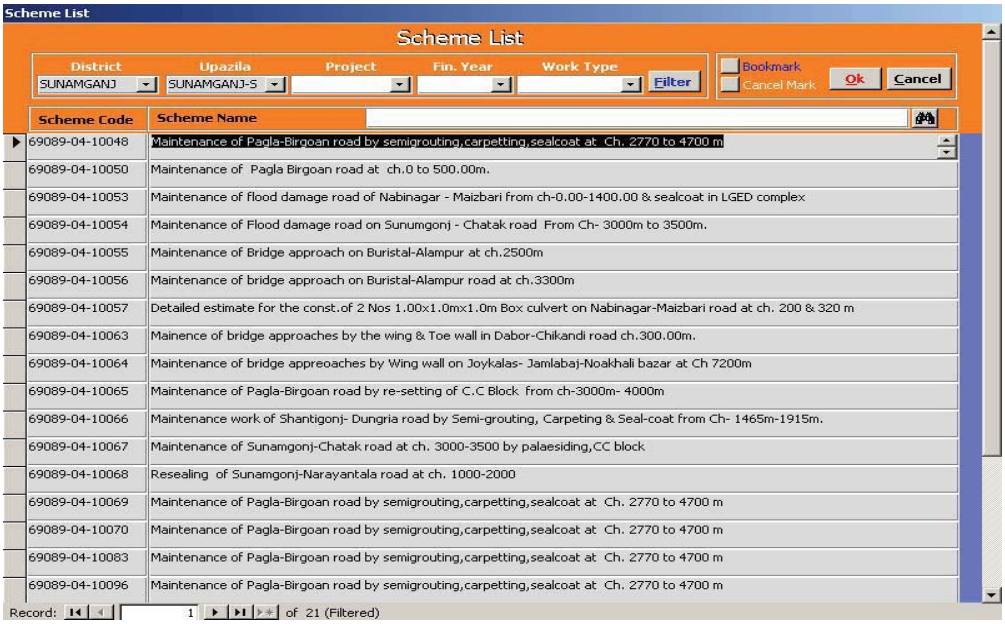
Note :
- একাধিক Item-এর Salvage Material থাকলে প্রতিটি Item-এর জন্য উপরোক্ত পদ্ধতি অনুসরন করতে হবে ।
- ভুলবশতঃ নেওয়া কোন Item-কে Item List for Salvage থেকে বাদ দিতে হলে সেটিকে Select করে [<<] Button-টি Click করতে হবে ।

▸▸ Estimate খুঁজে বের করা :

২টি পদ্ধতিতে Estimate খুঁজে বের করা যেতে পারে ।

১) Scheme Code এর ঘরে যে Estimate-টি খুঁজতে ইচ্ছুক তার Scheme Code বসিয়ে **Find Scheme By Code** Button-টি Click করলে Software-টি কাঙ্খিত Estimate খুঁজে বের করবে ।

২) **Find Scheme By Name** Button-টি Click করলে নিম্নোক্ত Screen টি আসবে ।



এরপর কাঙ্খিত Estimate-টি Select করে **Scheme Name**-এর ঘরে Double Click করে অথবা **OK** Button-টি Click করে Estimate-টি Open করা যাবে ।

- **Bookmark** :

যে কোন Estimate-টি Select করে **Bookmark** Button-টি Click করলে Estimate-টি Bookmark হয়ে যাবে অর্থাৎ পরবর্তীতে যে কোন Screen Open করলে Bookmarkকৃত Estimate-টি Selected হয়ে থাকবে ।

Note :
- District/Upazila/Project/Financial Year/Work Type Select করে **Filter** Button-এর মাধ্যমে Scheme-এর তালিকা Filter করা যেতে পারে ।
- Scheme Name এর ঘরে কোন Scheme-এর আংশিক নাম Type করে **Find** Button-এর মাধ্যমে Scheme-টি খুঁজে পাওয়া যাবে ।
- **Cancel mark** Button-টি Click করে Bookmark বাতিল করা যায় ।

⏩ Estimate Copy করা :

১টি Estimate-কে Copy করে একাধিক Estimate তৈরি করা যেতে পারে । কিছু ক্ষেত্রে একই ধরনের Estimate তৈরির জন্য এই Feature-টি ব্যবহার করা যেতে পারে ।

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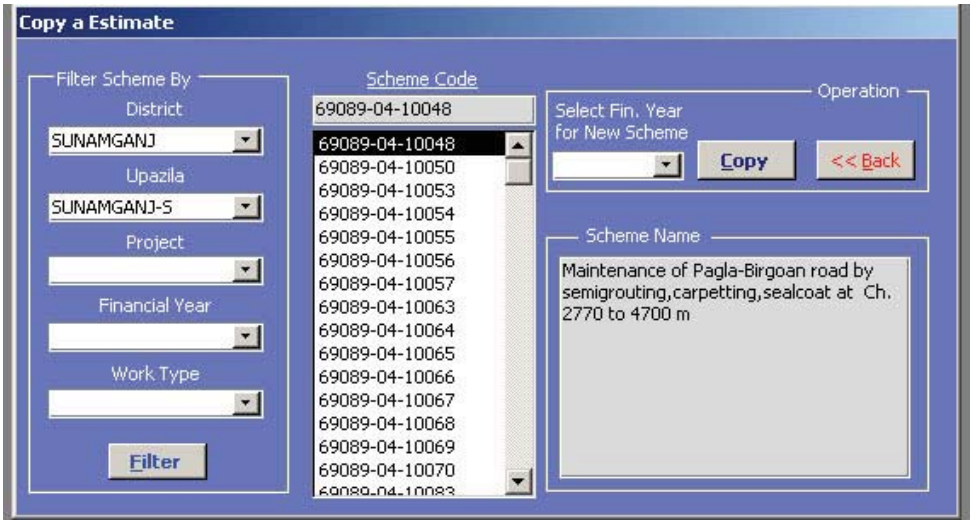
Button-টি Click করলে নিম্নোক্ত Screen টি আসবে ।



এখন যে Estimate-টি Copy করতে ইচ্ছুক সেটিকে List থেকে Select করতে হবে অতঃপর নতুন Estimate-টির জন্য অর্থবছর Select করে **Copy** Button-টি Click করলে Estimate-টি Copy হয়ে যাবে ।

এরপর **Back** Button-টি Click করলে সর্বশেষ Copy-কৃত Estimate-টি Screen-এ দেখা যাবে ।

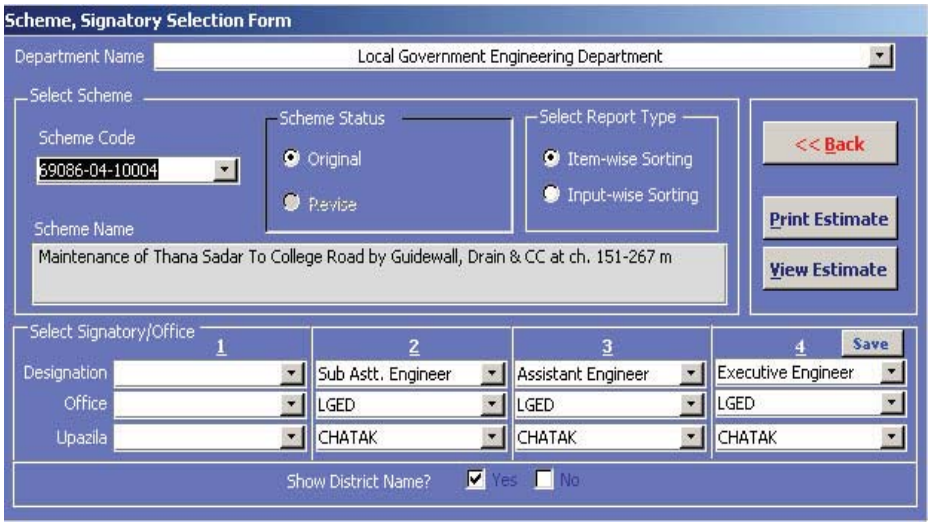
⏩ Estimate Print করা :

যে কোন Individual Estimate-কে Print করতে চাইলে তা **Estimate** তৈরির Screen থেকেই করা সম্ভব আবার **Report Generation** Screen থেকেও করা সম্ভব ।

কিন্তু Package Estimate Print করতে চাইলে **Report Generation** Screen থেকে তা Print করতে হবে ।

প্রথমে **Estimate** তৈরির Screen থেকে Print করার পদ্ধতি নিয়ে আলোচনা করা হবে ।

- এজন্য **Estimate** তৈরির Screen এর নিচের দিকে অবস্থিত  Button-টি Click করতে হবে । অতঃপর নিম্নোক্ত Screen-টি দেখা যাবে



- এখানে Default-ভাবে Scheme Code-টি Selected থাকবে এবং Scheme Status হিসাবে "Original" Selected থাকবে ।

- **Department Name:**

  Default-ভাবে এখানে LGED Selected থাকে কিন্তু যে Estimate-টি তৈরি করা হচ্ছে সেটি যদি অন্য কোন দপ্তরের হয়ে থাকে সেক্ষেত্রে এখানে সেই দপ্তরের নাম Type করে দিতে হবে ।

  Estimate এর উপরে Department Name টি এখান থেকেই প্রদর্শিত হয়ে থাকে।

Note : অন্য Department Name–এর নাম একবার Type করলে পরবর্তীতে Automatically তা এই List-এ দেখা যাবে ।

- **Report Type:**

  Item-wise Sorting: Print এর সময় Item-গুলি Item Code অনুযায়ী Sorting হবে ।

  Input-wise Sorting: Estimate তৈরির সময় যে ধারাবাহিকতায় Item-গুলি Input করা হয়েছে Print এর সময় সেই Serial অনুযায়ী Sorting হবে ।

- **Signatory Selection:**

  Estimate-এ স্বাক্ষর প্রদানের জন্য স্বাক্ষরকারীবৃন্দের Designation, office ইত্যাদি Select করা যায় । **Save** Button-টি Click করে উক্ত Selection সংরক্ষণ করা যায় ।

- এবার **View Estimate** Button-টি Click করে Estimate-দেখা যাবে অতঃপর Print করা যাবে । অথবা **Print Estimate** Button-টি Click করে Estimate-টি সরাসরি Print করা যাবে ।

Schedule বর্হিভূত Item of Work (IOW) Add করার পদ্ধতি

Overview

- Schedule বর্হিভুত IOW কি
- Schedule বর্হিভুত IOW Add করার পদ্ধতি
- Schedule বর্হিভুত IOW Edit করার পদ্ধতি
- Schedule বর্হিভুত IOW Estimate-এ ব্যবহার করার পদ্ধতি

এই Module-এ আমরা Schedule বর্হিভুত IOW নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Schedule বর্হিভুত Item of Work (IOW) বলতে কি বোঝায় ।
- কিভাবে Schedule বর্হিভুত Item of Work (IOW) Add/ Edit করা যায় ।
- Schedule বর্হিভুত Item of Work (IOW) কিভাবে Estimate-এ ব্যবহার করা যায়।

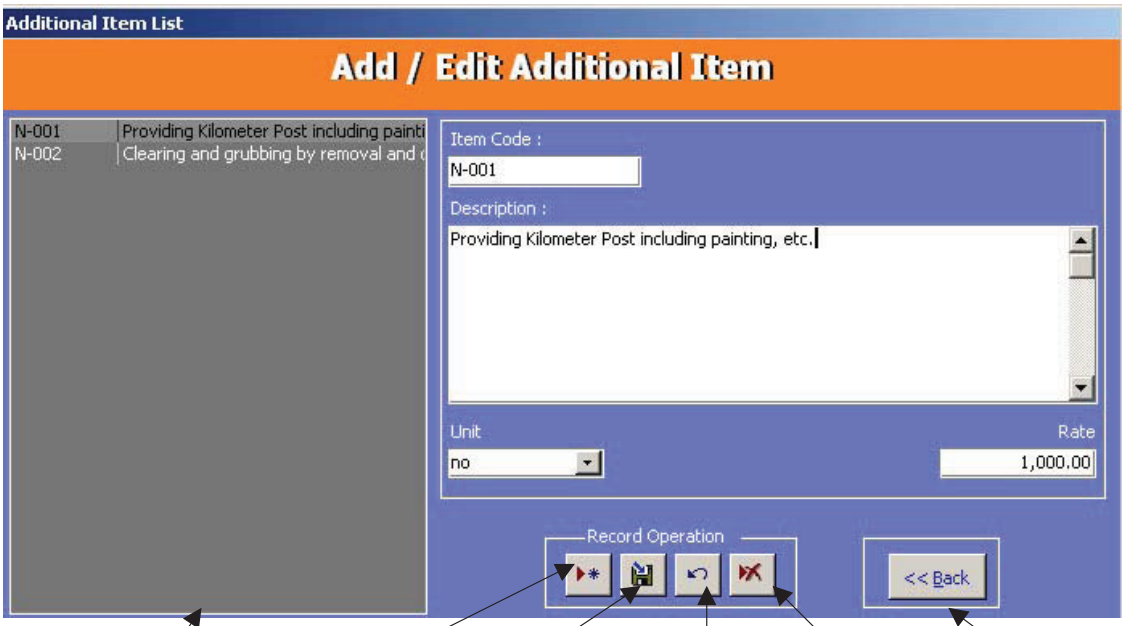
- **Schedule বর্হিভুত Item of Work (IOW) বলতে কি বোঝায় ঃ**

  উন্নয়ণমূলক কাজসমূহ বাস্তবায়নের সাথে সম্পৃক্ত IOW সমূহকে সুনির্দিষ্টকরনের লক্ষ্যে LGED কর্তৃক ১টি Standard Specification and Schedule of Rates প্রণয়ন করা হয়েছে, যেখানে LGED-এর উন্নয়ণমূলক কাজের সাথে সম্পৃক্ত প্রায় সকল IOW-কে অর্ন্তভূক্ত করা হয়েছে ।

  কিন্তু কিছু ক্ষেত্রে Estimate প্রস্তুত করার সময় এমন Item ব্যবহার করার প্রয়োজন পড়ে যা LGED-এর Schedule of Rates-এ অর্ন্তভূক্ত করা হয়নি । এই সকল Item-কে আমরা Schedule বর্হিভুত Item of Work (IOW) বলে থাকি ।

- **Schedule বর্হিভুত Item of Work (IOW) Screen Open করার পদ্ধতি ও Screen পরিচিতি ঃ**

  উক্ত কাজের জন্য Switch Board-এর "**Add/Edit Additional Item**" Button-টি Click করলে নিম্নোক্ত Screen-টি দেখা যাবে ।



Item List

এখানে Add-কৃত Item সমূহ উক্ত List-এ দেখা যাবে । List-এর যে Item-টিতে Click করা হবে সেই Item-টির Details Screen-এ দেখা যাবে।

New

উক্ত Button Click করে নতুন Item তৈরি করা যাবে।

Save

উক্ত Button Click করে Item Save করা যাবে।

Undo

উক্ত Button Click করে Undo করা যায় ।

Delete

উক্ত Button Click করে Item Delete করা যাবে।

Back

উক্ত Button করে Switch Board এ ফেরত যাওয়া যাবে।

- **Schedule বর্হিভুত Item of Work (IOW) Add করার পদ্ধতি ঃ**
  - "**New**" Button-টি Click করতে হবে ।
  - Item-টির জন্য ১টি কোড প্রদান করতে হবে । অতঃপর Item-টির Description, Unit ও Unit Rate Input করতে হবে ।
  - "**Save**" Button-টি Click করে Item-টি Save করা যাবে ।

Note :
- Lumpsum Item-এর জন্য কোন Rate প্রদান করতে হবে না ।
- Auto Save পদ্ধতিতে Software-টি নিজেই Record Save করতে থাকে।

- **Item of Work (IOW) Edit করার পদ্ধতি ঃ**
  - "**List**" থেকে কাঙ্খিত Item-টি Select করতে হবে ।
  - অতঃপর প্রয়োজনীয় Edit-এর কাজ করতে হবে ।
  - "**Save**" Button-টি Click করে Edit-কৃত Item-টি Save করা যাবে ।

- **Schedule বর্হিভুত Item of Work (IOW) Estimate-এ ব্যবহার পদ্ধতি ঃ**
  - Scheduled Item এর মত উক্ত Item গুলিও Estimate-এ ব্যবহার করা যাবে ।
  - সেক্ষেত্রে এখানে প্রদেয় Item Code-টি Estimate-এর Item Code ঘরে ব্যবহার করতে হবে ।

Package প্রস্তুত/ সংশোধন করার পদ্ধতি

Overview

- Package কি
- Package Add করার পদ্ধতি
- Package-এ Scheme Add করার পদ্ধতি
- Package-ও Scheme Filter করার পদ্ধতি

এই Module-এ আমরা Package নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

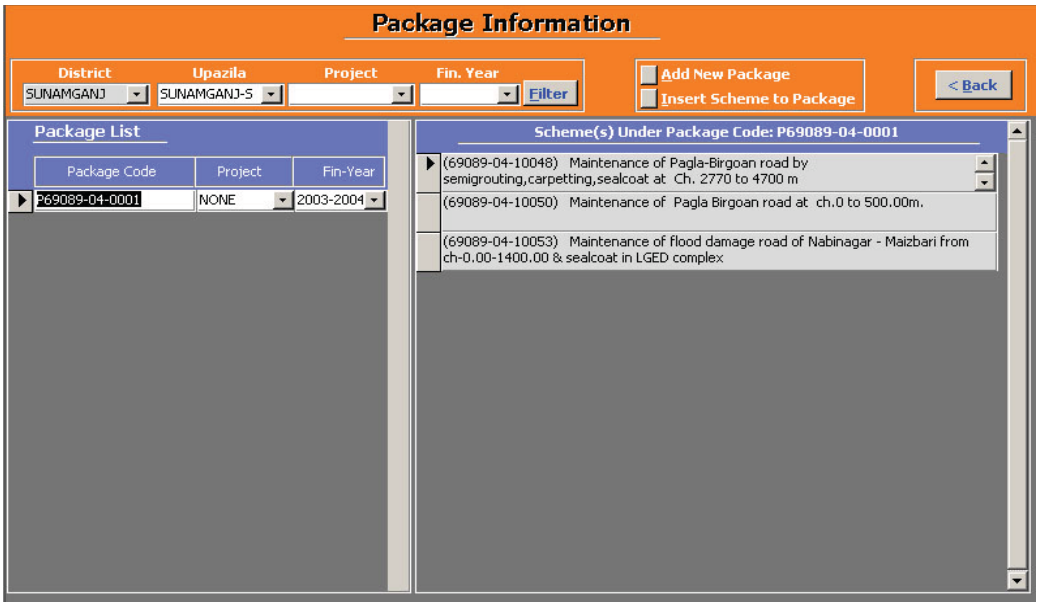
- Package বলতে কি বোঝায় ।
- কিভাবে Package Add/ Edit করা যায় ।
- কিভাবে Package-এ Scheme আনয়ন করা যায় ।
- Filter Option ব্যবহার করে কিভাবে Package/Scheme Filter করা যায়।

■ Package বলতে কি বোঝায় ঃ

দরপত্র আহবানের নিমিত্তে কিছু ছোট ছোট Scheme-কে সন্নিবেশিত করার প্রক্রিয়াকে আমরা Package বলে থাকি ।

■ Package -এর Data Entry Screen Open করার পদ্ধতি ঃ

Switch Board-এর "**Make Package**" Button-টি Click করে Package -এর Data Entry Screen Open করা যাবে । Screen-টি নিম্নরূপ ঃ



Screen-এ বিভিন্ন Button এর পাশাপাশি Package List ও ঐ Package-এর আওতায় ব্যবহৃত Scheme List দেখা যাচ্ছে ।

■ কিভাবে Package Add/ Edit করা যায় ঃ

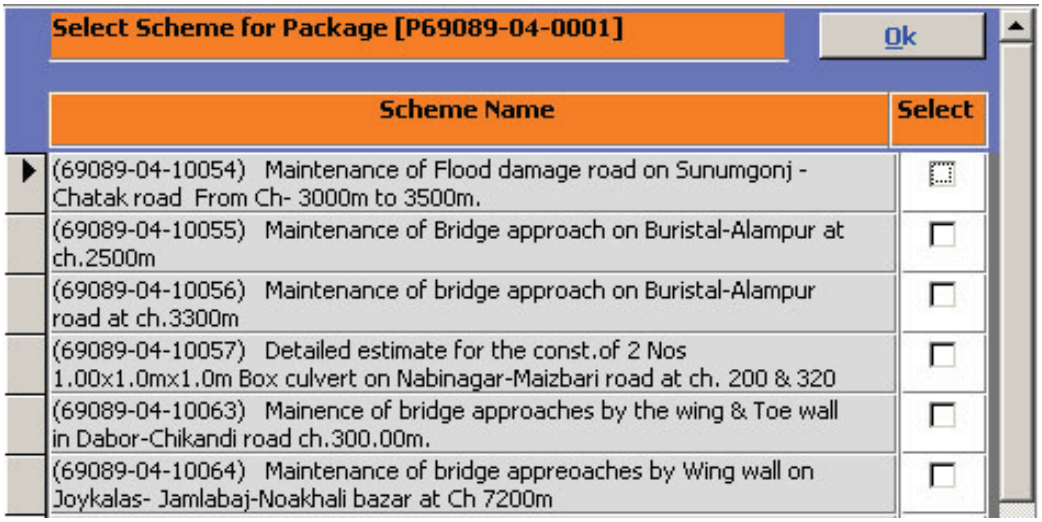
- Screen-টির উপরের ডান দিকে অবস্থিত "**Add New Package**" Button-টি করলে Package List এর সর্বনিম্নে ১টি Package তৈরি হয়ে যাবে এবং Default-ভাবে ১টি Package Code তৈরি হবে ।
- Package টির কোন সুনির্দিষ্ট কোড থাকলে Auto Generate-কৃত কোডটি মুছে ফেলে সেই কোডটি Input করতে হবে ।
- Package টি কোন Project এর হলে তার নাম ও অর্থবছর Select করতে হবে । (Package তৈরির সময় Default-ভাবে বর্তমান অর্থবছর Select হয়ে যায়)

■ Package-এ Scheme আনয়ন পদ্ধতি ঃ

যেহেতু কয়েকটি Scheme-এর সমন্বয়ে ১টি Package তৈরি হয় তাই Package তৈরির পর তাতে ব্যবহৃত Scheme-গুলি Select করা প্রয়োজন ।

নিম্নোক্তভাবে এই কাজটি সম্পাদন করা যায় ঃ

- Screen-টির উপরের ডান দিকে অবস্থিত **"Insert Scheme to Package"** Button-টি করতে হবে । এখন Scheme List-এর স্থলে নিম্নোক্ত Screen-টি দেখা যাবে



- এখানে RSEPS Software-এর মাধ্যমে তৈরিকৃত সকল Estimate সমূহ (যেগুলি অন্য কোন Package-এ ব্যবহার করা হয়নি) দেখা যাবে ।
- এখন Package এ ব্যবহৃত Scheme-গুলিকে উক্ত List থেকে টিক দিয়ে Select করতে হবে ।
- অতঃপর **OK** Button-টি করতে হবে ।

এভাবে প্রতিটি Package এর জন্য Scheme Select করা যায় ।

■ Filter Option ব্যবহার পদ্ধতি ঃ

Package তৈরি করতে করতে এর List-টি বড় হয়ে যেতে পারে । সেক্ষেত্রে কোন Package খুঁজে বের করার সুবিধার্থে Filter Option ব্যবহার করে List-টিকে ছোট করা যেতে পারি । একইভাবে Package এর জন্য Scheme Select করার সময় Filter Option ব্যবহার করে Scheme-এর List-টিকেও ছোট করা যেতে পারে ।

- Upazila/Project/Financial Year ইত্যাদি Select করে **"Filter"** Button-টি Click করলে Selection অনুযায়ী List Filter হবে ।
- এক্ষেত্রে সাধারণতঃ Package-এর List টি Filter হয় ।
- কিন্তু যখন Scheme Selection List-টি Open থাকে তখন **"Filter"** Button Click করলে Scheme-এর List টি Filter হবে ।

RSEPS ব্যবহার করে দরপত্র মূল্যায়ন ও এসংক্রান্ত বিভিন্ন Report Print করার পদ্ধতি

Overview

- Contractor List তৈরি করার পদ্ধতি
- Tender-এ Scheme, Tenderer আনয়ন ও Tenderer-এর Item-wise দর Input করার পদ্ধতি
- বাজার দর যাচাইয়ের পর Basic Material সমূহের বাজার দর Input করে Automatically IOW-এর দর নির্ণয়ের পদ্ধতি
- Tender Evaluation সংক্রান্ত Report সমূহ Print করার পদ্ধতি

এই Module-এ আমরা RSEPS ব্যবহার করে দরপত্র মূল্যায়ন ও এসংক্রান্ত বিভিন্ন Report Print করার পদ্ধতি নিয়ে আলোচনা করবো ।

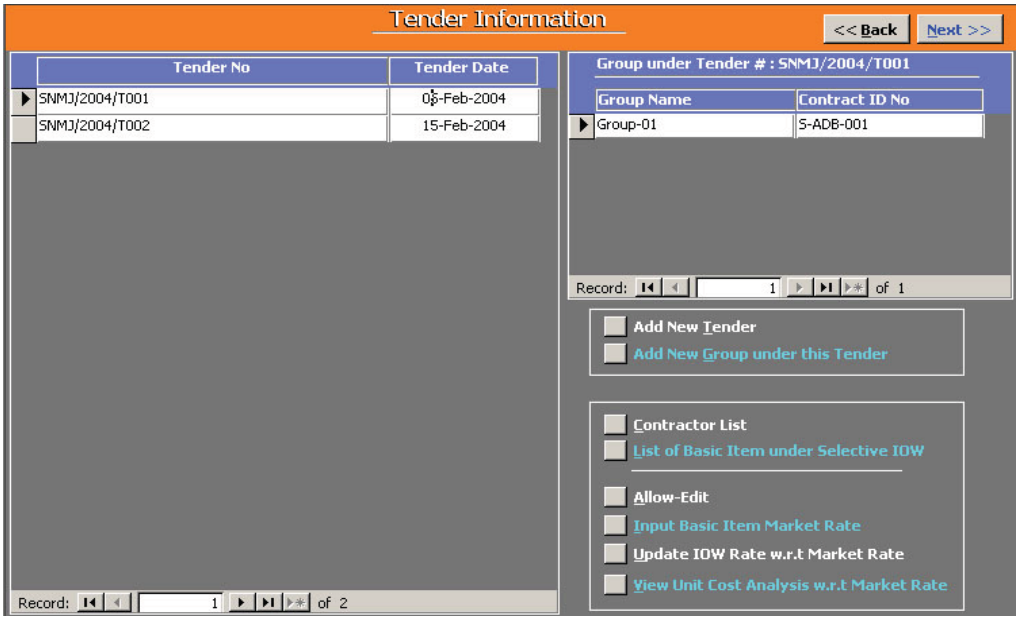
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Contractor List তৈরি করা যায় ।
- কিভাবে RSEPS Software-এর মাধ্যমে Tender/Group Add করে তাতে Scheme, Tenderer আনয়ন করা যায় ।
- কিভাবে Tenderer-এর Scheme-wise এবং Item-wise দর Input করা যায় ।
- কোন Item/Item সমূহের বাজার দর যাচাইয়ের প্রয়োজন হলে কিভাবে সেই Item সমূহে ব্যবহৃত Basic Material- গুলির তালিকা পাওয়া যায় ।
- Basic Material সমূহের বাজার দর Input করে কিভাবে Tender Evaluation ব্যবহৃত IOW সমূহের বাজার দর Automatically Update করা যায় এবং এতদসংক্রান্ত Unit Cost Analysis Print করা যায় ।
- কিভাবে দরপত্র মূল্যায়ন সংক্রান্ত বিভিন্ন Report Print করা যায় ।

দরপত্র মূল্যায়ন সংক্রান্ত কাজ সহজতরভাবে পরিচালনার লক্ষ্যে RSEPS Software-এ উক্ত Module-টি সংযোজন করা হয়েছে ।

- **Tender Evaluation -এর Data Entry Screen Open করার পদ্ধতি ঃ**

Switch Board-এর "**Tender Evaluation**" Button-টি Click করে Tender Information Screen-টি Open করা যেতে পারে । Screen-টি নিম্নরূপ ঃ



উক্ত Screen-এর বামদিকের ফ্রেমে Tender-এর তালিকা দেখা যাচ্ছে । এখানে Evaluation-এ ব্যবহৃত দরপত্রসমূহ যোগ করতে হবে ।

Screen-এর উপরে ডানদিকের ফ্রেমে Group-এর তালিকা দেখা যাচ্ছে । এখানে দরপত্রসমূহের গ্রুপগুলি যোগ করতে হবে ।

Screen-এর ডানদিকের নীচের অংশে কিছু Button দেখা যাচ্ছে । নিম্নে Button গুলির ব্যবহারিতা নিয়ে আলোচনা করা হলো ঃ

- **Add New Tender:** Evaluation-এ ব্যবহৃত দরপত্রসমূহ Add করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Add New Group under this Tender:** Evaluation-এ ব্যবহৃত দরপত্রসমূহের গ্রুপ Add করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Contractor List:** দরপত্রসমূহে অংশগ্রহনকারী ঠিকাদারদিগকে Add করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **List of Basic Item under Selective IOW:** কোন Item/Item সমূহের বাজার দর যাচাইয়ের প্রয়োজন হলে সেই Item সমূহে ব্যবহৃত Basic Material- গুলির তালিকা পাওয়ার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Allow Edit:** Basic Material সমূহের বাজার দর Input/ IOW সমূহের বাজার দর Update ইত্যাদি কাজের জন্য Password প্রদানের প্রয়োজন হয় । উক্ত Button-টি ব্যবহার করে Password প্রদান করতে হবে ।

- **Input Basic Item Market Rate:** Basic Material সমূহের বাজার দর Input করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **Update IOW Rate w.r.t Market Rate:** Basic Material সমূহের বাজার দরের প্রেক্ষিতে Tender-এ ব্যবহৃত Item সমূহের বাজার দর Update করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।
- **View Unit Cost Analysis w.r.t Market Rate:** বাজার দরের প্রেক্ষিতে IOW-সমূহের Unit Cost Analysis দেখা এবং Print করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

■ Contractor List তৈরির পদ্ধতি ঃ

Detail Tender Evaluation-এ যাবার পূর্বে উক্ত দরপত্রের দরপত্রদাতাদের তালিকা তৈরি করে নিতে হবে । অংশগ্রহনকারী যে সকল দরদাতার নাম ইতিমধ্যে এই List-এ সংযোজন করা হয়েছে তাদেরকে নতুন ভাবে তালিকাভুক্ত করার প্রয়োজন নেই অর্থাৎ Contractor List-টিকে সবসময় Re-use করা যাচ্ছে ।

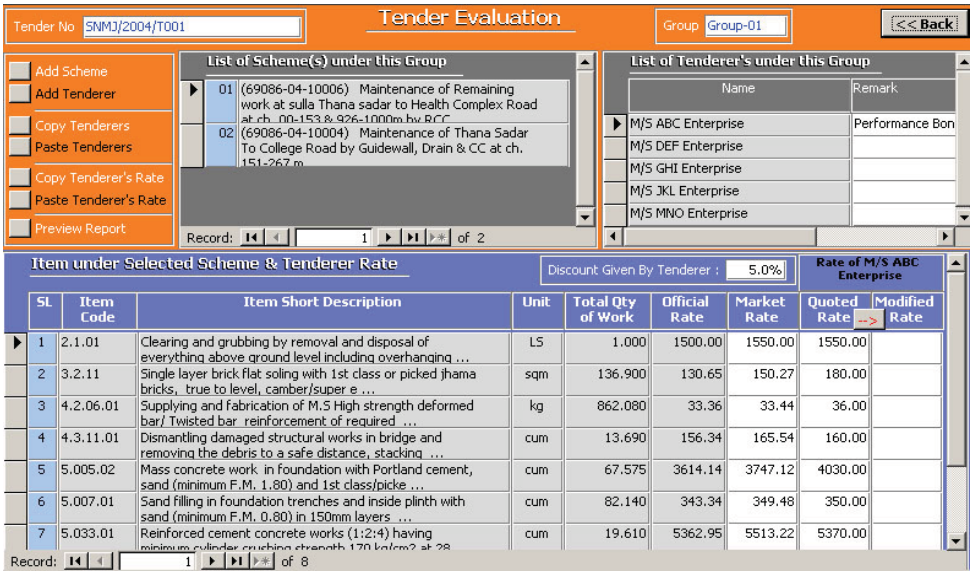
- দরপত্রদাতাদের তালিকা তৈরি করার জন্য "**Contractor List**" Button-টি Click করতে হবে । অতঃপর Contractor-এর List Screen-টি Open হবে যা নিম্নরূপ ঃ

- নতুন Contractor-এর নাম Input করার জন্য "**Add New Contractor**" Button-টি Click করতে হবে । এখন List-টির নীচে ১টি Row তৈরি হবে সেখানে Contractor-এর নাম, শ্রেণী, ঠিকানা, ফোন নং Input করতে হবে ।
- কোন Contractor-কে খুঁজে পেতে হলে List-টি Scrol করে অথবা **Find** Menu ব্যবহার করে কাজটি করা যাবে ।
- কোন Contractor-কে মুছে ফেলতে হলে প্রথমে List থেকে Contractor-টিকে Select করতে হবে অতঃপর Menu থেকে **Delete** Button ব্যবহার করতে হবে ।
- "**Print Contractor List**" Button-টিতে Click করে উক্ত Software-এ সংরক্ষিত দরপত্রদাতাদের তালিকা Print করা যাবে ।

■ দরপত্র মূল্যায়ন সংক্রান্ত Data Input-এর পদ্ধতি ঃ

- প্রথমে *Add New Tender* Button-টি Click করতে হবে । এতে করে Tender List-টির নীচে ১টি Row তৈরি হবে এবং Default-ভাবে উক্ত দরপত্রের জন্য ১টি গ্রুপ (Group-01) তৈরি হবে ।
- এবার Tender List-এর দুটি কলামে যথাক্রমে আহবানকৃত দরপত্রের নম্বর ও তারিখ দ্বারা পুরণ করতে হবে ।
- এবার Group List-এ দরপত্রের গ্রুপের নাম ও Contract ID নম্বর (যদি থাকে) দ্বারা পুরণ করতে হবে ।
- দরপত্রে একাধিক গ্রুপ বিদ্যমান থাকলে *Add New Group under this Tender* Button-টি Click করে একের পর এক গ্রুপ যোগ করা যাবে ।
- অতঃপর দরপত্রের নম্বর ও গ্রুপের নাম Selected অবস্থায় 

Button-টি click করলে নিম্নরূপ Screen-টি পাওয়া যাবে যেখানে দরপত্র মূল্যায়ন সংক্রান্ত অন্যান্য Data Entry সম্পাদন করা যাবে ।

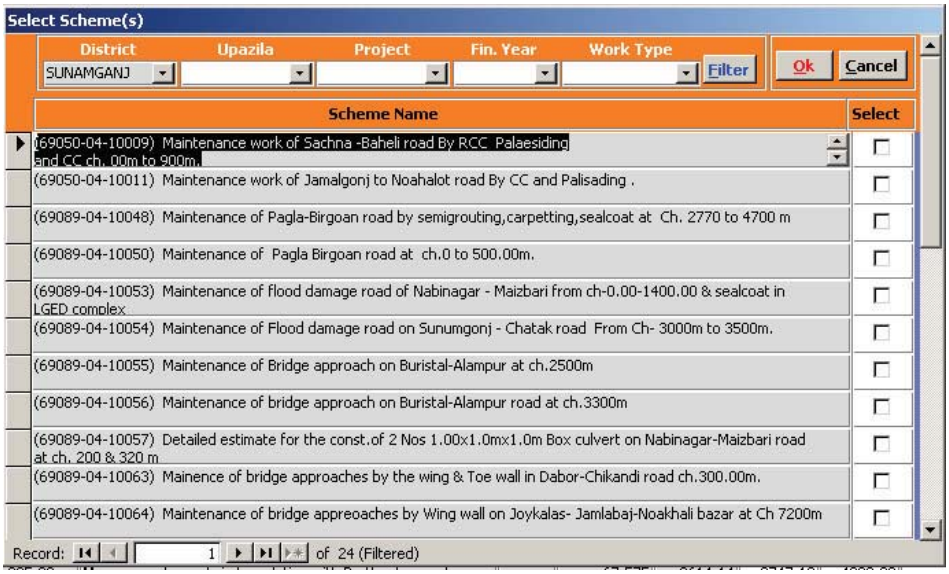


- **Tender Evaluation-এর Screen পরিচিতি** ঃ
  - Screen-টির উপরের অংশে বামদিকে কিছু Button দেখা যাচ্ছে যা এখানে বিভিন্ন কাজে ব্যবহার করা যাবে ।
  - তার ডান পাশে এই দরপত্রে ব্যবহৃত Scheme-এর তালিকা দেখা যাচ্ছে । নতুন দরপত্রের ক্ষেত্রে এই তালিকায় Scheme যোগ করতে হবে ।
  - তার ডান পাশে এই দরপত্রে অংশগ্রহনকারী দরপত্রদাতাদের তালিকা দেখা যাচ্ছে । নতুন দরপত্রের ক্ষেত্রে এই তালিকায় দরপত্রদাতা যোগ করতে হবে।
  - নীচের অংশে Selected Scheme-এর Item-সমূহ ও সেগুলির Short Description, Unit,কাজের পরিমান, Official দর দেখা যাবে এবং পাশাপাশি Selected দরদাতার উদ্ধৃত দর পূরনের ঘর দেখা যাচ্ছে ।

■ দরপত্র মূল্যায়ন সংক্রান্ত Data Input-এর পদ্ধতি ঃ

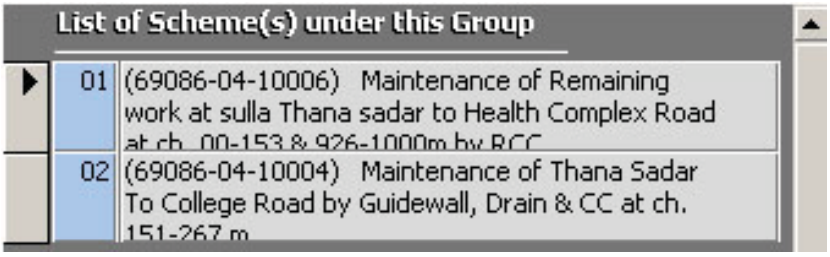
❑ Scheme আনয়ন ঃ

▭ এইজন্য *Add Scheme* Button-টি Click করলে নিম্নরূপ Scheme List Screen-টি পাওয়া যাবে ঃ



▭ এখানে উল্লেখ্য যে, দরপত্র মূল্যায়নে ব্যবহৃত Scheme-গুলি RSEPS-এ সংরক্ষিত থাকতে হবে ।

▭ এখন কাঙ্খিত স্কীম/স্কীমসমূহের বিপরীতে Select কলামে টিক দিয়ে OK click করতে হবে । এতে করে Select -কৃত স্কীম/স্কীমসমূহে ব্যবহৃত সকল Item ও সেগুলির কাজের পরিমান, Official দর Tender Evaluation Screen-এ চলে যাবে ।



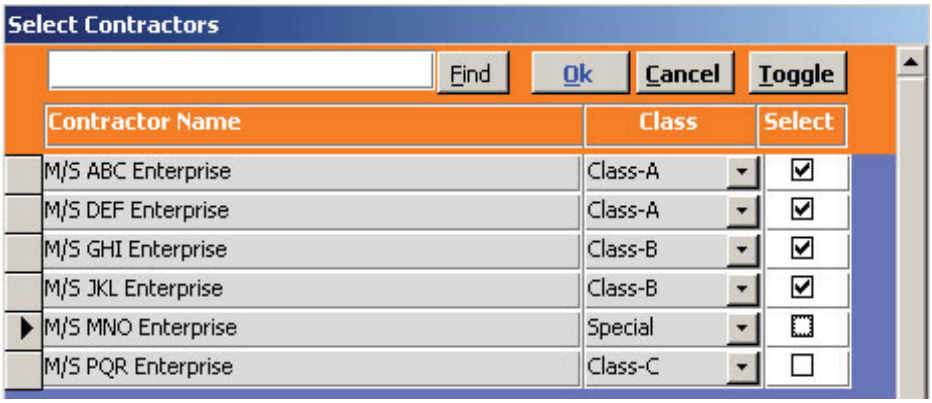
▭ এখানে Scheme-এর পাশে Automatically SL No পড়ে । Tender Schedule-এর সাথে সমন্বয় রাখার প্রয়োজনে এই SL No পরিবর্তন করা যাবে ।

Note :

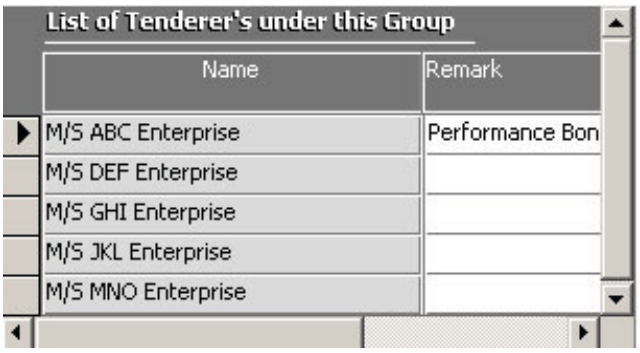
❑ দরপত্র মূল্যায়নে ব্যবহৃত Scheme-গুলি হয় RSEPS-এ সংরক্ষিত থাকতে হবে অথবা দরপত্র মূল্যায়ন শুরু করার পূর্বে তা RSEPS দ্বারা তৈরি করে নিতে হবে ।

❑ Scheme List-এ উপজেলা, প্রকল্প, অর্থ বছর ও কাজের ধরন অনুযায়ী Filter করার সুবিধা রয়েছে ।

- **দরপত্রদাতা (Tenderer) আনয়ন ঃ**
  - এইজন্য *Add Tenderer* Button-টি Click করলে নিম্নরূপ Contractor List Screen-টি পাওয়া যাবে ঃ



  - এখন অংশগ্রহনকারী দরদাতার বিপরীতে Select কলামে টিক দিয়ে OK click করতে হবে । এতে করে Select -কৃত দরপত্রদাতাসমূহ ব্যবহৃত Tender Evaluation Screen-এ চলে যাবে ।



  - Remark কলামে দরদাতার বিপরীতে মন্তব্য প্রদান করা যাবে ।

- **দরদাতার Scheme-wise এবং Item-wise উদ্ধৃত দর Input করার পদ্ধতি ঃ**

Item under Selected Scheme & Tenderer Rate — Discount Given By Tenderer : 5.0% — Rate of M/S ABC Enterprise

SL	Item Code	Item Short Description	Unit	Total Qty of Work	Official Rate	Market Rate	Quoted Rate -->	Modified Rate
1	2.1.01	Clearing and grubbing by removal and disposal of everything above ground level including overhanging ...	LS	1.000	1500.00	1550.00	1550.00	
2	3.2.11	Single layer brick flat soling with 1st class or picked jhama bricks, true to level, camber/super e ...	sqm	136.900	130.65	150.27	180.00	
3	4.2.06.01	Supplying and fabrication of M.S High strength deformed bar/ Twisted bar reinforcement of required ...	kg	862.080	33.36	33.44	36.00	
4	4.3.11.01	Dismantling damaged structural works in bridge and removing the debris to a safe distance, stacking ...	cum	13.690	156.34	165.54	160.00	
5	5.005.02	Mass concrete work in foundation with Portland cement, sand (minimum F.M. 1.80) and 1st class/picke ...	cum	67.575	3614.14	3747.12	4030.00	
6	5.007.01	Sand filling in foundation trenches and inside plinth with sand (minimum F.M. 0.80) in 150mm layers ...	cum	82.140	343.34	349.48	350.00	
7	5.033.01	Reinforced cement concrete works (1:2:4) having minimum cylinder crushing strength 170 kg/cm2 at 28	cum	19.610	5362.95	5513.22	5370.00	

Record: 1 of 8

Screen-টির উপরোক্ত অংশে দরদাতার উদ্ধৃত দর Input করতে হবে ।

- প্রথমে যে দরদাতার উদ্ধৃত দর Input করতে যাচ্ছি সেই দরদাতাকে *Tender List*-এ Select করতে হবে ।
- যদি দরপত্রে একাধিক Scheme থেকে থাকে তাহলে দরদাতার যে Scheme-এর উদ্ধৃত দর Input করতে যাচ্ছি সেই Scheme-টিকে *Scheme List*-এ Select করতে হবে ।
- অতঃপর *Quoted Rate* কলামে দরদাতার উদ্ধৃত দর Input করতে হবে ।
- এভাবে একে একে অংশগ্রহনকারী সকল দরদাতার উদ্ধৃত দর Input করতে হবে ।
- **Modified Rate:** যদি কোন দরপত্রদাতা পরিবর্তিত দরপত্র দাখিল করে সেইক্ষেত্রে উক্ত দরদাতার পরিবর্তিত দর অথবা কোন দরদাতার দাখিলকৃত দরপত্রে গাণিতিক ভুলত্রুটি থাকলে তা সংশোধন পরবর্তী দর উক্ত কলামে Input করতে হবে ।

  --> Button-টি Click করে দরদাতার উদ্ধৃত দর (Quoted Rate) সমূহ *Modified Rate* কলামে নেওয়া যাবে ।

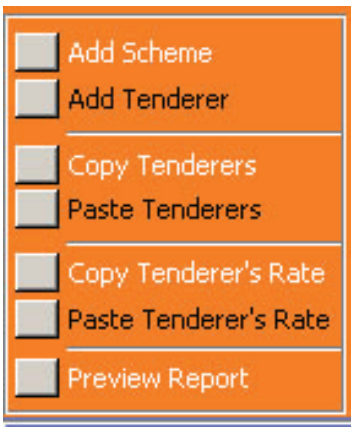
- **Discount Given By Contractor:** যদি কোন দরপত্রদাতা উদ্ধৃত/পরিবর্তিত দরের উপর Discount প্রদানের কথা উল্লেখ করে সেইক্ষেত্রে দরদাতার উদ্ধৃত Scheme-Wise Discount-এর শতকরা হার উক্ত ঘরে Input করতে হবে ।
- **Market Rate:** দরপত্র মূল্যায়নের সময় যদি কোন Item/ Item-সমূহের বাজার দর যাচাইয়ের প্রয়োজন পড়ে সেইক্ষেত্রে Item-সমূহের যাচাইকৃত বাজার দর উক্ত কলামে প্রদান করতে হবে ।

  উক্ত কলামে Automatically বাজার দর আনয়নের পদ্ধতি নিয়ে পরবর্তীতে আলোচনা করা হবে ।

- **Item SL:** Scheme আনয়নের সময় Estimate এর Item SL No অনুযায়ী Automatically SL No পড়ে । Tender Schedule-এর সাথে সমন্বয় রাখার প্রয়োজনে এই SL No পরিবর্তন করা যাবে ।

Note : Data Entry করার সুবিধার্থে কলাম Lock/Unlock করা যায় । এইজন্য Quoted Rate/Modified Rate কলামের Header- এ Click করলে সংশ্লিষ্ট কলামটি Lock/Unlock হয়ে যাবে ।

- **Tender Evaluation Screen-এর Button সমূহের কার্যকারীতা ঃ**



Add Scheme ও Add Tenderer Button-এর কার্যকারীতা পূর্বে আলোচনা করা হয়েছে । এখানে অবশিষ্ট Button সমূহের কার্যকারীতা আলোচনা করা হবে ।

- **Copy Tenderers:** এই Button-টি Click করে ১টি দরপত্রে সংযোজনকৃত দরদাতার তালিকা Copy করে অন্য দরপত্রে Paste করা যাবে ।

  মনেকরি ১টি দরপত্র **"ক"**-তে ২০ জন দরপত্রদাতা অংশগ্রহন করেছিল যাদের সকলেই বা অধিকাংশই অন্য আরেকটি দরপত্র **"খ"**-তে অংশগ্রহন করেছে। এরকম ক্ষেত্রে **"ক"** দরপত্রের দরপত্রদাতাদেরকে Copy করে **"খ"** দরপত্রে Paste করা যাবে ।

- **Paste Tenderers:** ১টি দরপত্রের Copy-কৃত দরদাতার তালিকা অন্য আরেকটি দরপত্রে Paste করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Copy Tenderer's Rate:** এই Button-টি Click করে ১ জন দরদাতার Scheme ওয়ারী উদ্ধৃত সকল Item-এর দরসমূহ Copy করা যাবে ।

  মনেকরি দরপত্রের ১টি গ্রুপে ৩টি Scheme আছে যার অধিকাংশ Item সমূহই Common । দরপত্রদাতা Common Item সমূহের জন্য একই দর উদ্ধৃত করতে পারে । সেইক্ষেত্রে প্রতিটি Scheme-এর জন্য দরদাতার উদ্ধৃত দরসমূহ Type না করে Copy/Paste নেওয়া যেতে পারে ।

- **Paste Tenderer's Rate:** Copy-কৃত দরদাতার দর Paste করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

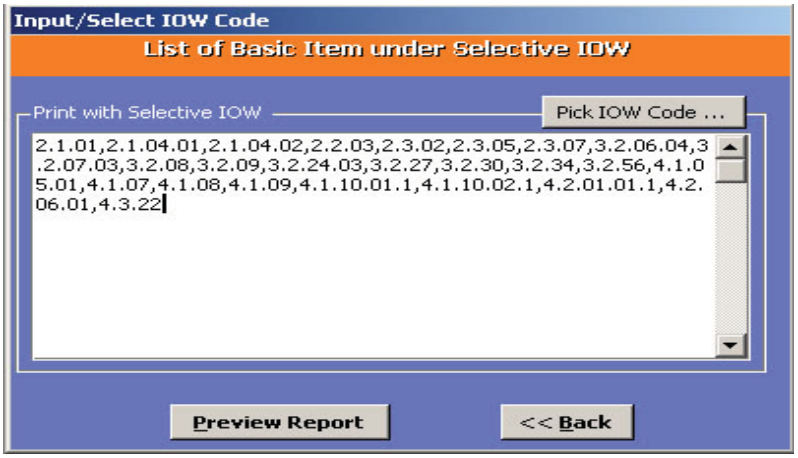
- **Preview Report:** Tender Evaluation সংক্রান্ত Report সমূহ Print করার জন্য উক্ত Button-টি ব্যবহার করতে হবে ।

- **Selective Item(s)-এ ব্যবহৃত Basic Material সমূহের তালিকা প্রাপ্তির পদ্ধতিঃ**

দরপত্র মূল্যায়নের সময় সর্বনিম্ন Responsive দরদাতার কোন Item/Item সমূহের দর ১০% এর কম/বেশী হলে উক্ত Item (IOW)সমূহের বাজার দর যাচাইয়ের প্রয়োজন পড়ে ।

এইক্ষেত্রে বাজার দর যাচাইয়ের নিমিত্তে Item সমূহে ব্যবহৃত Basic Material-গুলির তালিকা প্রয়োজন । নিম্নোক্তভাবে সেই তালিকা পাওয়া সম্ভব ঃ

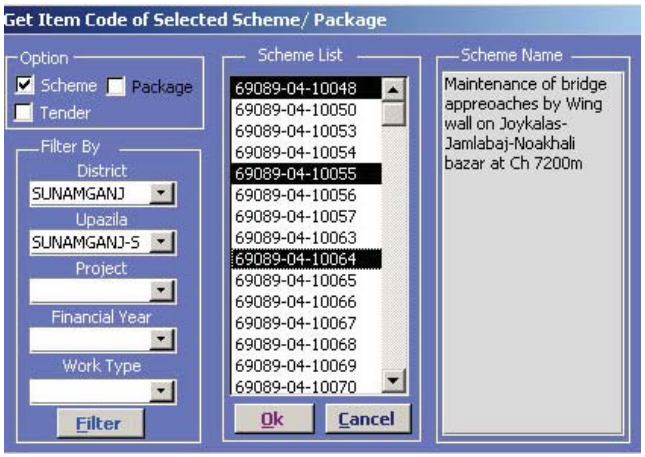
- **Tender Information** Screen থেকে **List of Basic Item under Selective IOW** Button-টি Click করতে হবে । অতঃপর নিম্নোক্ত Screen-টি দেখা যাবে ।



- এখন IOW-এর ঘরে প্রয়োজনীয় Item-এর কোড সমূহ কমা (,) দ্বারা Seperate করে Input করতে হবে ।

- অতঃপর **Preview Report** Button-টিতে Click করলে কাঙ্খিত Basic Material সমূহের তালিকাটি পাওয়া যাবে ।

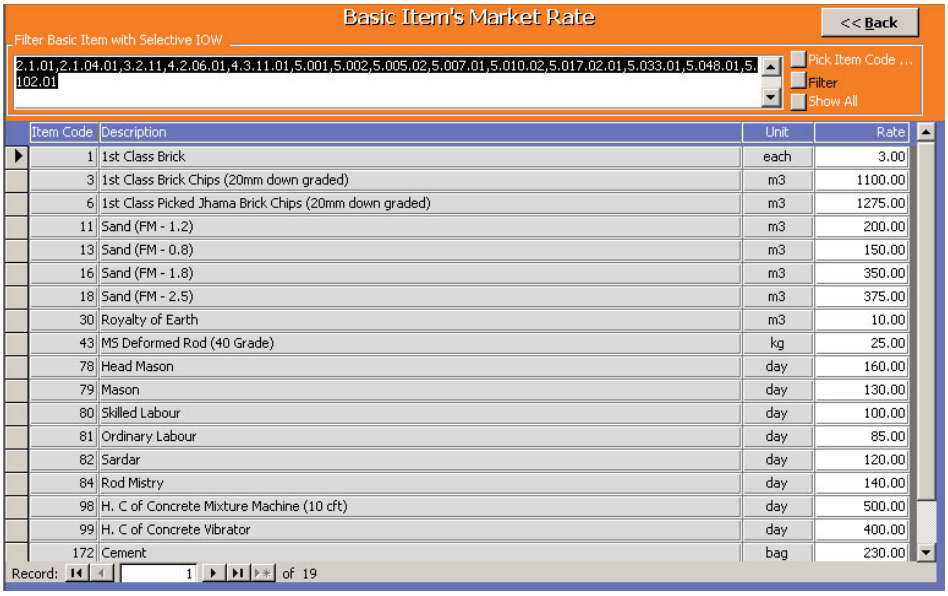
- এখানে ব্যবহৃত Item এর সংখ্যা অনেক বেশী হলে Type না করে *Pick IOW Code* Button-টিতে Click করে নিম্নোক্তভাবে সহজেই তা আনয়ন করা যায় ঃ



উক্ত Screen-টিতে পছন্দ অনুযায়ী Scheme(s), Package(s) বা Tender(s) Select করে **OK** Button-টিতে Click করলে Select-কৃত Scheme(s)/ Package(s)/Tender(s) এ ব্যবহৃত Item-এর কোড সমূহ Autometically IOW-এর ঘরে চলে যাবে ।

- **Basic Material সমূহের বাজার দর সংগ্রহের পর তা Input করার পদ্ধতি ঃ**

  - **Tender Information** Screen থেকে **Input Basic Item Market Rate** Button-টি Click করতে হবে । অতঃপর নিম্নোক্ত Screen-টি দেখা যাবে ।



  - Basic Material সমূহের বাজার দর Input করতে হবে ।
  - এখানে Schedule-এ ব্যবহৃত সকল Basic Material এর তালিকা দেখা যায় তবে কাজের সুবিধার্থে এই তালিকাকে সংক্ষিপ্ত করে নেওয়া যায় ।
  - এজন্য পূর্বোক্তভাবে IOW-এর ঘরে প্রয়োজনীয় Item কোড সমূহ Input/Pick করে **Filter** Button-টি Click করলে শুধুমাত্র ঐ সকল Item-এ ব্যবহৃত Basic Material সমূহ তালিকায় দেখা যাবে ।

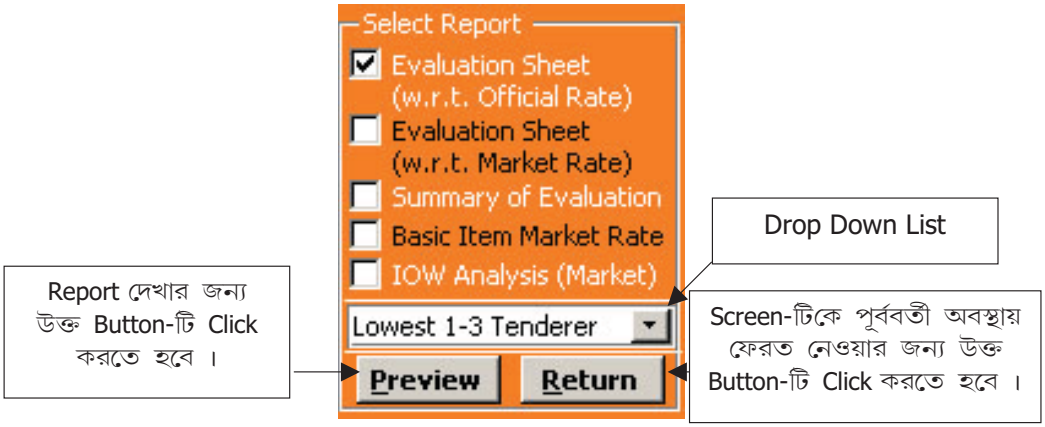
- **Basic Material সমূহের বাজার দর সংগ্রহ ও তা Input করার পর IOW সমূহের বাজার দর Automatically Update করার পদ্ধতি ঃ**

  - **Tender Information** Screen থেকে যে দরপত্রটির জন্য বাজার দর Update করতে ইচ্ছুক সেটি Select করে **Update IOW Rate w.r.t Market Rate** Button-টি Click করলে শুধুমাত্র ঐ দরপত্রে ব্যবহৃত সকল Item-এর বাজার দর Automatically Update হয়ে যাবে ।

Note :
- **Tender Information** Screen থেকে **View Unit Cost Analysis w.r.t Market Rate** Button-টি Click করে বাজার দর মোতাবেক IOW-এর Unit Cost Analysis Preview এবং Print করা যায় ।

- **Tender Evaluation সংক্রান্ত Report সমূহ Print করার পদ্ধতি ঃ**

এইজন্য প্রথমে **Tender Evaluation** Screen এর **Preview Report** Button-টি Click করতে হবে । অতঃপর Screen-টির বাম দিকের অংশ পরিবর্তিত হয়ে নিম্নোক্তরূপ ধারন করবে ঃ



- **Evaluation Sheet (w.r.t. Official Rate):** এটি LGED-এর Official দরের Respect-এ দরদাতাদের দাখিলকৃত দরের মূল্যায়ন ও তুলনামূলক বিবরণী, যেখানে Automatically সর্বনিম্ন দরদাতা হতে শুরু হয়ে উর্দ্ধক্রমানুসারে অন্যান্য দরদাতাদের তথ্য পাশাপাশি দেখা যাবে এবং সর্বনিম্ন responsive দরদাতার প্রাক্কলিত মূল্যের চেয়ে ১০% এর বেশী/কম দাখিলকৃত দর চিহ্নিত অবস্থায় প্রদর্শিত হবে ।

  এখানে ১টি পৃষ্ঠায় প্রতিটি গ্রুপ/স্কীমের ৩টি করে দরদাতার তথ্য দেখানো সম্ভব বিধায় Report-টি Preview করার সময় Drop down list থেকে একে একে "Lowest 1-3 Tenderer", "Lowest 4-6 Tenderer"... ইত্যাদি Select করে নিতে হবে ।

- **Evaluation Sheet (w.r.t. Market Rate):** এটি বাজার দরের Respect-এ দরদাতাদের দাখিলকৃত দরের মূল্যায়ন ও তুলনামূলক বিবরণী ।

- **Summary of Evaluation:** দরপত্র মূল্যায়নের সারসংক্ষেপ ও দরদাতা নির্বাচনের সিদ্ধান্ত সম্বলিত বিবরণী উক্ত Report হতে দিতে হবে ।

- **Basic Item Market Rate:** দরপত্র মূল্যায়নে বাজার দরের প্রয়োগ করা হলে বাজার দরসহ Basic Material সমূহের তালিকা উক্ত Report হতে দিতে হবে।

- **IOW Analysis (Market):** দরপত্র মূল্যায়নে বাজার দরের প্রয়োগ করা হলে বাজার দর মোতাবেক IOW-এর Unit Cost Analysis উক্ত Report হতে দিতে হবে ।

Contract Information সংরক্ষণ এবং Revise Estimate প্রস্তুত/সংশোধন ও Print করার পদ্ধতি

Overview

- কিভাবে Contract Information সংরক্ষণ করা যায়
- কিভাবে Revise Estimate প্রস্তুত করা যায়
- কিভাবে Revise Estimate Print করা যায়
- Revise Estimate এর Comparative Statement

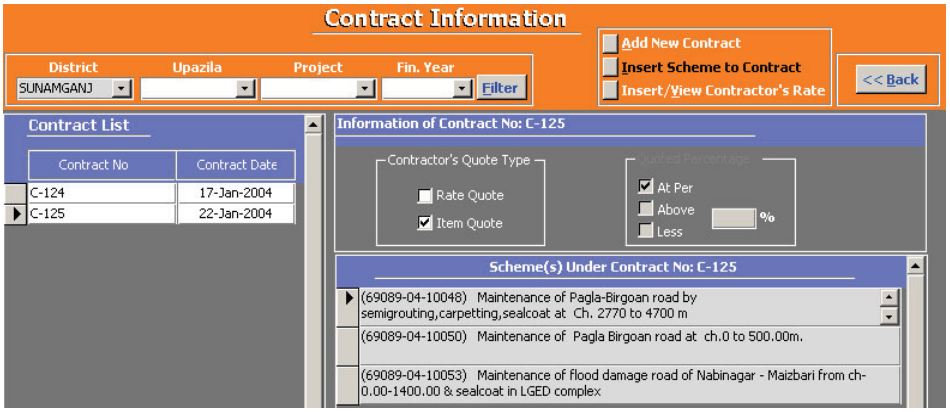
এই Module-এ আমরা Contract Information, Revise Estimate, Revise Estimate এর Comparative Statement ইত্যাদি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Contract Information, দরদাতার দর সংরক্ষণ করা যায় ।
- পূর্বে তৈরিকৃত Estimat-এর তথ্য ব্যবহার করে কিভাবে সহজে Revise Estimate প্রস্তুত করা যায় ।
- কিভাবে Revise Estimate এ Non-Tender Item যোগ করা যায় ।
- কিভাবে Revise Estimate এর Automatic Comparative Statement পাওয়া যায় ।

■ Contract Information সংরক্ষণ করার পদ্ধতি ঃ

Switch Board-এর "**Contract Information**" Button-টি Click করে Contract Information Screen-টি Open করা যেতে পারে । Screen-টি নিম্নরূপ ঃ

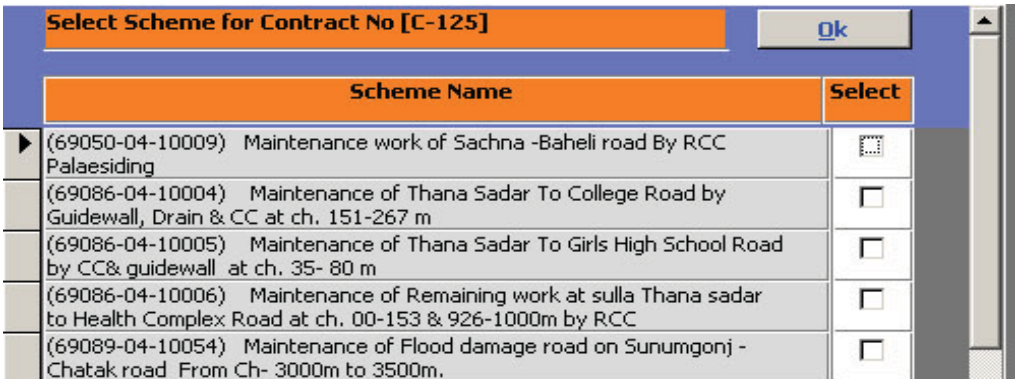


■ কিভাবে Contract Add করা যায় ঃ

- Screen-টির উপরের ডান দিকে অবস্থিত "**Add New Contract**" Button-টি করলে Contract List এর সর্বনিম্নে ১টি Row তৈরি হয়ে যাবে এখানে Contract No ও Date Input করতে হবে । এবার দরপত্রের ধরন (Item Quote/ Rate Quote) Select করতে হবে ।
- অতঃপর দরপত্রে ব্যবহৃত Scheme-সমূহ Select করতে হবে এবং দরদাতার দর Input করতে হবে ।

■ Contract-এ Scheme Selection পদ্ধতি ঃ

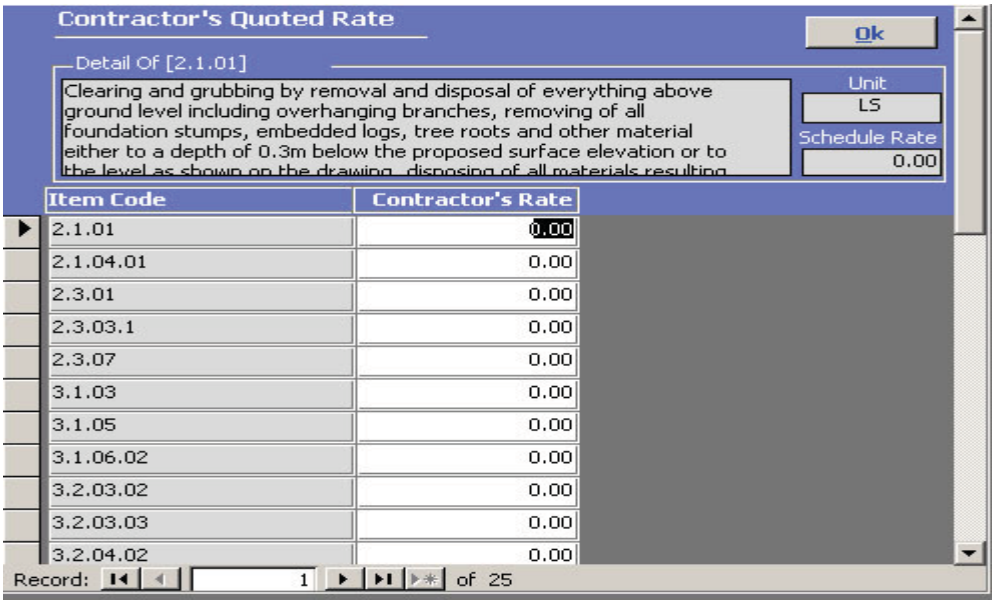
- Screen-টির উপরের ডান দিকে অবস্থিত "**Insert Scheme to Contract**" Button-টি করতে হবে । এখন Scheme List-এর স্থলে নিম্নোক্ত Screen-টি দেখা যাবে



- এখানে RSEPS Software-এর মাধ্যমে তৈরিকৃত সকল Estimate সমূহ (যেগুলি অন্য কোন Contract-এ ব্যবহার করা হয়নি) দেখা যাবে ।
- এখন Contract-এ ব্যবহৃত Scheme-গুলিকে উক্ত List থেকে টিক দিয়ে Select করতে হবে ।
- অতঃপর **OK** Button-টি করতে হবে ।

■ দরদাতার দর **Input/Edit** করার পদ্ধতি ঃ

- Screen-টির উপরের ডান দিকে অবস্থিত "**Input/View Contractor's Rate**" Button-টি করলে ডান দিকের Screen-টি পরিবর্তিত হয়ে নিম্নোক্ত Screen-টি দেখা যাবে ঃ

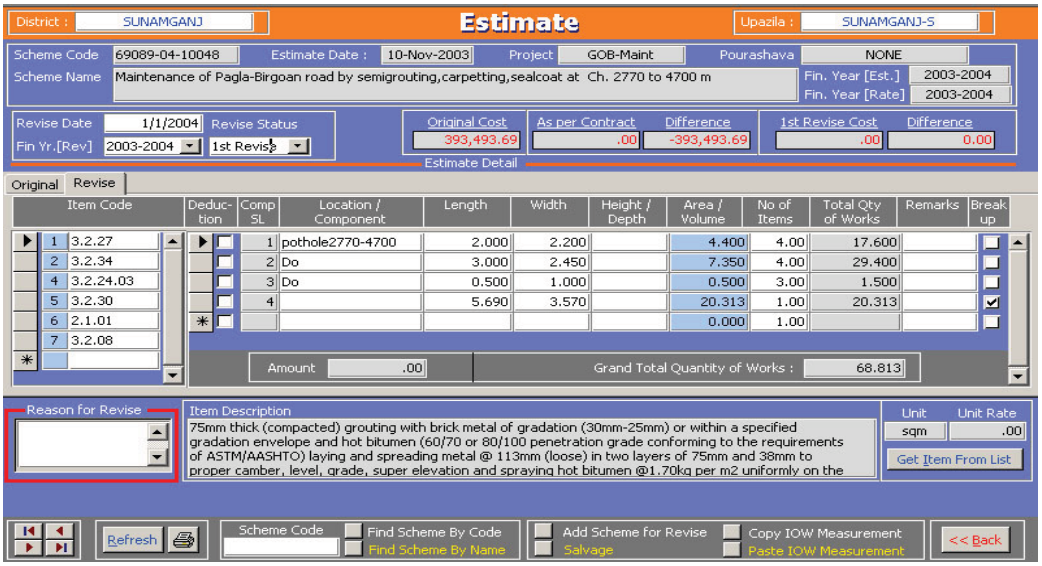


- এখানে দরদাতার দর Input/Edit করতে হবে ।
- **OK** Button-টি করে পূর্ববর্তী Screen-এ ফেরত যাওয়া যাবে ।

Note :
- Upazila/Project/Financial Year ইত্যাদি Select করে "**Filter**" Button-টি Click করলে Selection অনুযায়ী List Filter হবে ।
- এক্ষেত্রে সাধারণতঃ Contract-এর List টি Filter হয় ।
- কিন্তু যখন Scheme Selection List-টি Open থাকে তখন "**Filter**" Button Click করলে Scheme-এর List টি Filter হবে ।

■ Revise Estimate ঃ

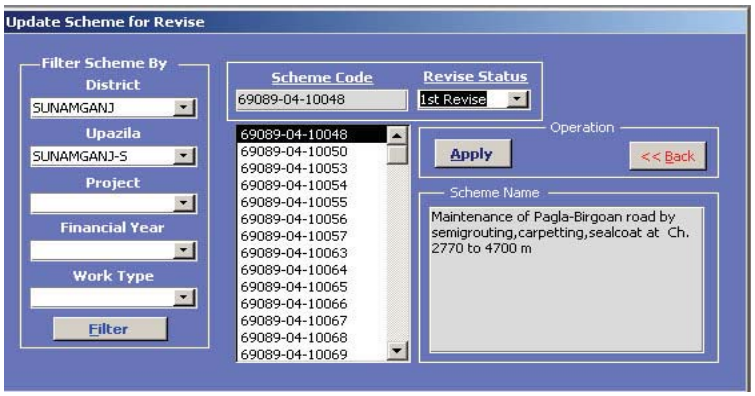
Switch Board-এর "**Revise Estimate**" Button-টি Click করে Revise Estimate-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



এখানে অন্যান্য তথ্যের পাশাপাশি "Origianl" ও "Revise" নামক ২টি Tab দেখা যাচ্ছে। *Original Tab*-এ RSEPS ব্যবহার করে তৈরিকৃত সকল প্রাক্কলনসমূহ *এবং Revise Tab*-এ Revise-কৃত প্রাক্কলনসমূহ দেখা যাবে ।

■ Revise Estimate প্রস্তুত/ সংশোধন করার পদ্ধতি ঃ

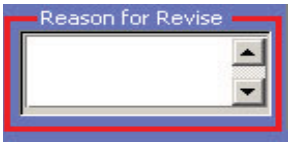
- কোন প্রাক্কলন Revise করার জন্য প্রথমে Screen-টির নীচে মাঝামাঝি অবস্থিত "**Add Scheme for Revise**" Button-টি করতে হবে । অতঃপর নিম্নোক্ত Screen-টি দেখা যাবে ঃ



- এখন যে Estimate-টি Revise করতে চাই সেটিকে Select করতে হবে অতঃপর Revise Status (1st Revise, 2nd Revise,...) Select করতে হবে ।
- এখন **Apply** Button-টি Click করতে হবে । এতে করে Estimate-টির পূর্বের Status-এর তথ্য (Item, Detail Measurement) দিয়ে Revise Estimate তৈরি হয়ে যাবে এবং **<<Back** করলে তা Revise Tab-এ দেখা যাবে ।

- পূর্বে উল্লেখিত পদ্ধতিতে Revise Estimate তৈরি করার পর Item-এর Quantity পরিবর্তন/ পরিবর্ধন করা যাবে ।
- Screen-টির নিম্নোক্ত অংশে Revision Date, Financial year of revision প্রদান করতে হবে ।

- ১টি Estimate একাধিকবার Revise করা হয়ে থাকলে *Revise Status* drop down List-থেকে (1st Revise, 2nd Revise,...) Select করে উক্ত Estimate সমূহের তথ্যাদি দেখা যাবে ।
- কোন Item-এর Quantity পরিবর্তন/পরিবর্ধন-এর কারন উল্লেখ করার জন্য Item-টি Select করে Screen-টির নিম্নোক্ত অংশে তা প্রদান করতে হবে ।



- **Non-Tender Item (NTI):**

  এখানে আলাদাভাবে NTI Input করার কোন প্রয়োজন নেই । এক্ষেত্রে Revise Tab-এর Item Code ঘরে নতুন Item Input করলে Software-টি Automatically সেটিকে NTI হিসাবে ধরে নেয় ।

- **Revise Estimate Print করা :**

  Module-2 তে Estimate Print করার পদ্ধতি নিয়ে আলোচনা করা হয়েছে । Revise Estimate Print করার জন্যও একই পদ্ধতি অবলম্বন করতে হবে । অর্থাৎ Screen এর নিচের দিকে অবস্থিত  Button-টি Click করে পরবর্তী Screen-এর **Preview** Button-টি Click করতে হবে ।

- **Comparative Statement:**

  Revise Estimate-টি Print/Preview করার সময় Report-টির শেষ পাতায় Automatically Comparative Statement পাওয়া যায় ।

Note: ❑ কোন Estimate Revise করার পূর্বে অবশ্যই Scheme-টির Contract Information দিতে হবে ।

Basic Item সমূহের দর দেখার/ প্রস্তাব করার পদ্ধতি Item of Work (IOW) এর Analysis দেখার পদ্ধতি

Overview

- কিভাবে Basic Material সমূহের বিভিন্ন অর্থবছর অনুযায়ী Approved দর দেখা যায়
- কিভাবে IOW-এর Analysis (Without Rate) দেখা যায়
- Basic Material এর দর প্রস্তাব করার পদ্ধতি

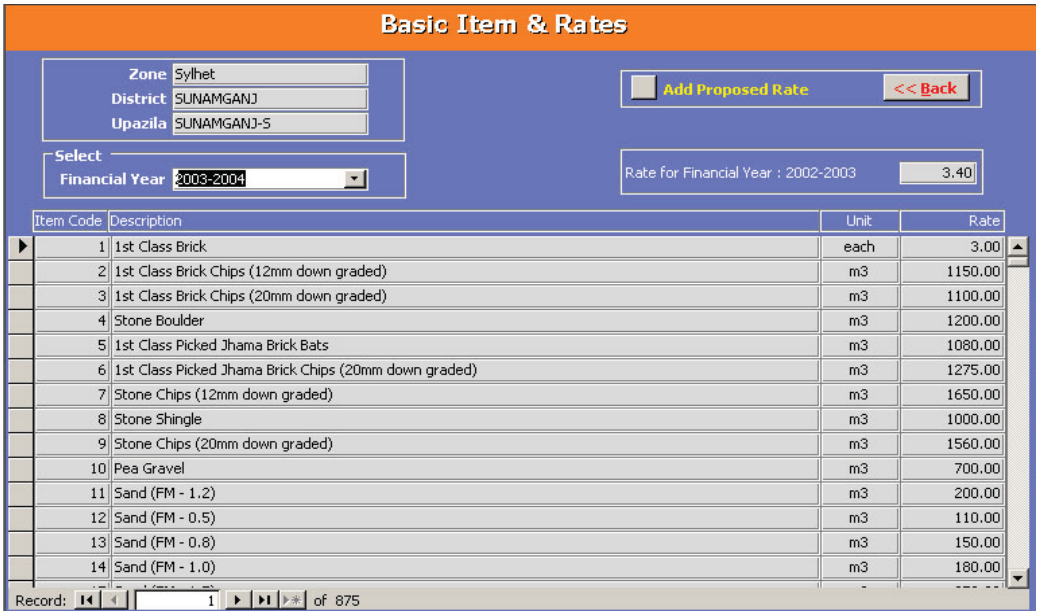
এই Module-এ আমরা Basic Material সমূহের দর দেখা/ প্রস্তাব করার পদ্ধতি, Item of Work (IOW)-এর Analysis দেখা ইত্যাদি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে বিভিন্ন অর্থবছর অনুযায়ী Basic Material সমূহের Approved দর দেখা যায় ।
- কিভাবে প্রয়োজনে Basic Material সমূহের দর প্রস্তাব করা যায় ।
- কিভাবে Item of Work (IOW)-এর Analysis দেখা যায় ।

■ Basic Material সমূহের অনুমোদিত দর দেখার পদ্ধতি ঃ

Switch Board-এর "**View/Edit Basic Items Rate**" Button-টি Click করে Basic Item-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



RSEPS Software-এ ১৭ টি জোন অনুযায়ী বিগত অর্থবছরগুলির Basic Material সমূহের অনুমোদিত দর সংরক্ষিত থাকে ।

- বিভিন্ন অর্থবছরের Basic Material সমূহের অনুমোদিত দর দেখার জন্য **Financial Year** List থেকে কাঙ্খিত অর্থবছরটি Select করতে হবে ।
- এখানে উল্লেখ্য যে, Basic Material সমূহের অনুমোদিত দর শুধুমাত্র দেখা যাবে, পরিবর্তন করা যাবে না ।

■ Basic Material সমূহের দর প্রস্তাব করার পদ্ধতি ঃ

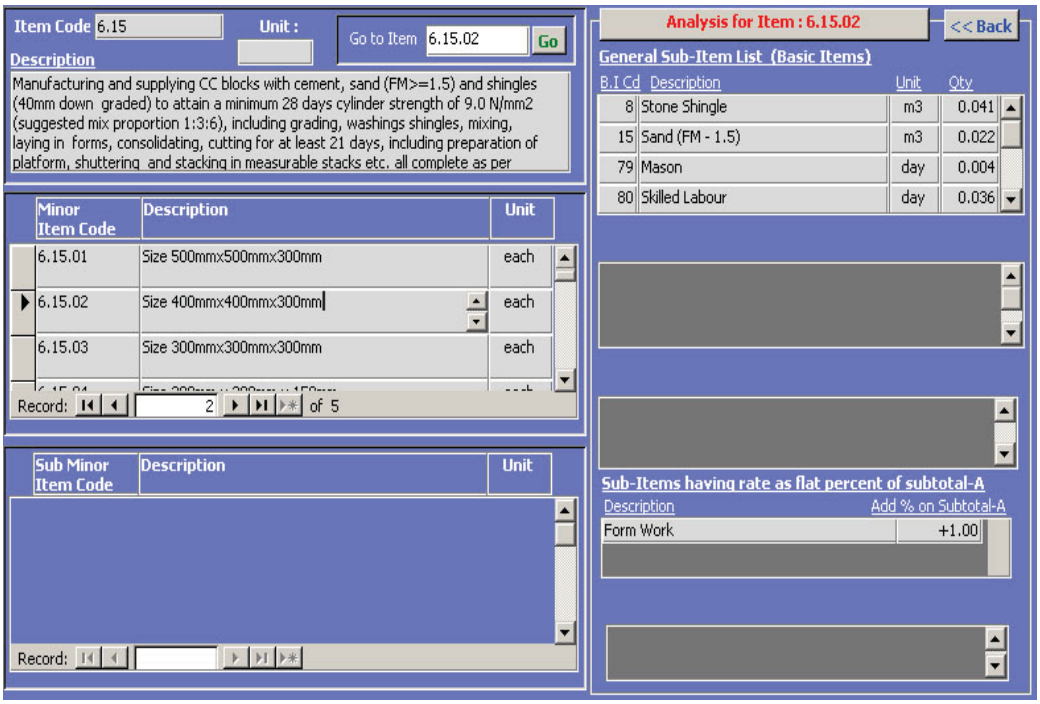
সদর দপ্তর হতে Schedule of Rates update করার নিমিত্তে জেলা অফিস সমূহ থেকে বর্তমান বাজার মোতাবেক দর প্রস্তাব করতে বলা হয়, যা উক্ত Software-এর মাধ্যমে পাঠাতে হয় ।

- উক্ত কাজটি করার জন্য প্রথমে "**Add Proposed Rate**" Button-টি Click করতে হবে। অতঃপর অর্থবছর Select/Type করে **Apply** Button-টি Click করতে হবে ।

- এখন Basic Material সমূহের বাজার থেকে সংগৃহীত দর Input যাবে ।
- অতঃপর Export করে তা সদর দপ্তরে পাঠিয়ে দেওয়া যাবে । Export সংক্রান্ত বিষয়ে পরবর্তী Module-এ আলোচনা করা হবে ।

■ IOW সমূহের Analysis দেখার পদ্ধতি ঃ

Switch Board-এর "**View Analysis of Item of Works**" Button-টি Click করে IOW Analysis-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- Screen টির বাম দিকের অংশে Item Code, Description, ঐ Item টির Minor/Sub-Minor Item সমূহ (যদি থাকে) দেখা যাবে এবং ডান দিকের অংশে Item-টির Analysis দেখা যাবে ।
- Record Navigation Button –এ Click করে করে বিভিন্ন Item–এ যাওয়া যায় ।
- আবার Go to Item-এর ঘরে Item Code Input করে কোন নির্দিষ্ট এর Analysis দেখা যাবে ।
- এখানে শুধু IOW-এর Analysis দেখা যায়, দর দেখা যায় না ।

Note: দর সহ/ছাড়া IOW-এর Detailed Analysis, Report Option থেকে দেখা/ Print করা যায় । উক্ত বিষয়ে Module:9-এ আলোচনা করা হবে।

Estimate, Basic Item এর দর ইত্যাদি Export/Import করার পদ্ধতি

Overview

- কিভাবে Estimate Export/Import করা যায়
- কিভাবে Basic Material-এর প্রস্তাবিত দর Export করা যায়
- কিভাবে Approved Rate Import করা যায়
- কিভাবে Additional Item Export/Import করা যায়

এই Module-এ আমরা Data Export/Import- এর বিভিন্ন ধরনের Option ও পদ্ধতি নিয়ে আলোচনা করবো ।

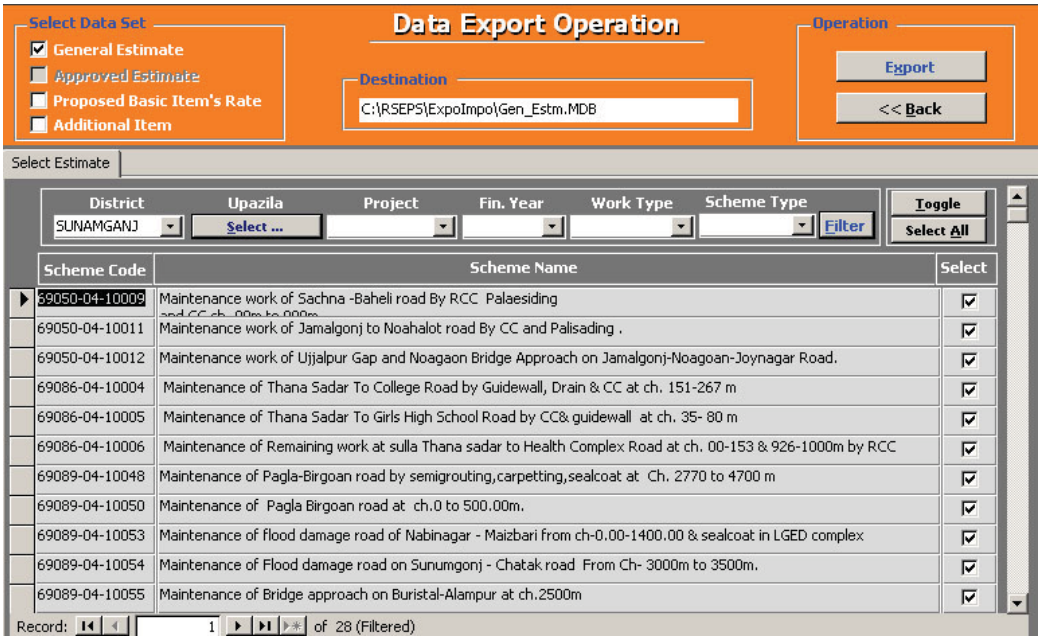
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Estimate Export করা যায় ।
- কিভাবে Basic Material-এর প্রস্তাবিত দর Export করা যায় ।
- কিভাবে Additional Item Export করা যায় ।
- কিভাবে Estimate Import করা যায় ।
- কিভাবে Approved Rate Import করা যায় ।
- কিভাবে Additional Item Import করা যায় ।

উপজেলা থেকে জেলা/সদর দপ্তর, জেলা থেকে সদর দপ্তর বা এক Computer থেকে অন্য Computer-এ Data Exchange-এর লক্ষ্যে RSEPS Software-টিতে Export/Import পদ্ধতি সংযোজন করা হয়েছে ।

- **Data Export করার পদ্ধতি ঃ**

Switch Board-এর "**Data Export Operation**" Button-টি Click করে Export-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



Export করার জন্য প্রথমে **Data Set** থেকে যে কোন একটি Option (যেমন ঃ General Estimate, Proposed Basic Item's Rate, ...) এবং সেই Option সম্পর্কিত অন্যান্য তথ্য Select করে **Export** Button-টি Click করতে হবে ।

অতঃপর Destination Box-এ উল্লেখিত Location ও File Name অনুযায়ী ১টি Data File তৈরি হবে । পরবর্তীতে উক্ত Data File-টি যে কোন Removable Drive (Floopy Disk, CD, Mobile Drive)-এ Copy করে পাঠাতে হবে ।

- **Destination:** Export Operation শেষ হওয়ার পর Destination Box-এ উল্লেখিত Location-এ Data File-টি তৈরি হবে । উপরোক্ত Screen অনুযায়ী Estimate Export করার পর "**C:\RSEPS\ExpoImpo**" Folder-এর মধ্যে **Gen_Estm.MDB** নামক ১টি File তৈরি হবে ।

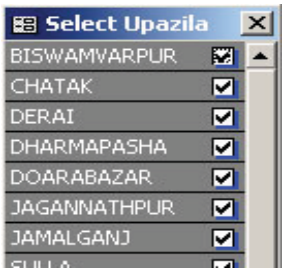
Note: Destination Box-এ উল্লেখিত Location/File Name-টি প্রয়োজনে পরিবর্তন করা যাবে ।

- **Estimate Export করার পদ্ধতি ঃ**

  - প্রথমে **Data Set** থেকে "**General Estimate/Approved Estimate**" Option-টি Select করতে হবে । এখানে উল্লেখ্য যে, Approved Estimate Option-টি শুধুমাত্র Head Quarter Module-এ Enable থাকবে ।
  - এখন Destination Box-এ Location ও File Name হিসাবে Default-ভাবে General Estimate-এর জন্য "C:\RSEPS\ExpoImpo\Gen_Estm.MDB" Approved Estimate -এর জন্য "C:\RSEPS\ExpoImpo\Apprv_Estm.MDB" দেখা যাবে ।
  - অতঃপর Scheme List থেকে বাছাইকৃত Estimate সমূহ Select করতে হবে ।
  - অবশেষে **Export** Button-টি Click করতে হবে ।

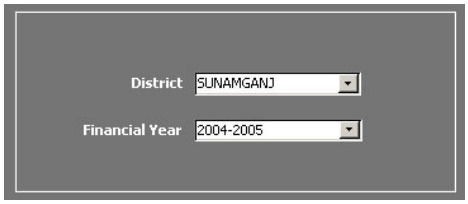
  Filter Option:

  - Estimate Selection এর সময় **Toggle/Select All** Button-টি ব্যবহার করা যেতে পারে ।
  - District, Upazila, Project, Fin. Year, Work Type ইত্যাদি Option ব্যবহার করা Scheme List Filter করা যেতে পারে ।
  - Upazila এর *Select* Button-টি Click করলে পার্শ্বস্থ Screen-টি দেখা যাবে যেখানে District List-এ Select-কৃত জেলার উপজেলাসমূহ দেখা যাবে ।
  - এখানে এক বা একাধিক উপজেলা Select করা সম্ভব ।



- **Basic Material-এর প্রস্তাবিত দর Export করার পদ্ধতি ঃ**

  - প্রথমে **Data Set** থেকে "**Proposed Basic Item's Rate**" Option-টি Select করতে হবে ।
  - এখন Destination Box-এ Location ও File Name হিসাবে Default-ভাবে "C:\RSEPS\ExpoImpo\Prop_BIR.MDB" দেখা যাবে ।
  - অতঃপর জেলা এবং প্রস্তাবিত দরের অর্থবছর Select করতে হবে ।

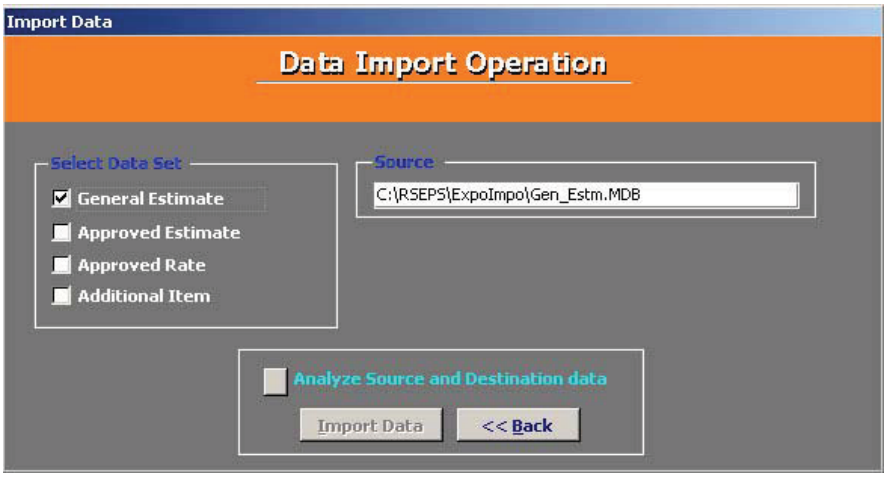


  - অবশেষে **Export** Button-টি Click করতে হবে ।

- **Additional Item Export করার পদ্ধতি ঃ**
  - প্রথমে **Data Set** থেকে "**Additional Item**" Option-টি Select করতে হবে ।
  - এখন Destination Box-এ Location ও File Name হিসাবে Default-ভাবে "C:\RSEPS\ExpoImpo\Addl_Item.MDB" দেখা যাবে ।
  - অবশেষে **Export** Button-টি Click করতে হবে ।

■ Data Import করার পদ্ধতি ঃ

Switch Board-এর "**Data Import Operation**" Button-টি Click করে Import-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- প্রথমে Import-কৃত File-টিকে "**C:\RSEPS\ExpoImpo**" Path-এ রাখতে হবে । তবে প্রয়োজনে অন্য Location থেকেও Import করা সম্ভব । সেক্ষেত্রে Source-এর স্থলে File-টির Path ও File Name (Extension সহ) Type করে দিতে হবে ।
- এবার **Data Set** থেকে যে কোন একটি Option Select করতে হবে ।
- এবার **Analyze Source and Destination data** Button-টি Click করতে হবে ।
- এখন Software-টি Source এবং Destination-এর data analyze করবে । যদি duplicate data পাওয়া যায় তবে duplicate data'র তালিকা সম্বলিত ১টি Report দেখা যাবে এবং সিদ্ধান্ত প্রদানের জন্য Screen-এর Source অংশের নীচে নিম্নোক্ত Option দেখা যাবে, যেখানে Option দুটির যেকোন ১টি Select করা যাবে ।

- অবশেষে **Import Data** Button-টি Click করতে হবে ।

Estimate, Schedule of Works, IOW এর Analysis সহ বিভিন্ন Report Print করার পদ্ধতি

Overview

- কিভাবে Estimate/Package Estimate Print করা যায়
- কিভাবে Bill of Quantity (BOQ) Print করা যায়
- কিভাবে Schedule of Works Print করা যায়
- কিভাবে IOW এর Analysis Print করা যায়
- Estimate ও Schedule of Rates সংক্রান্ত অন্যান্য Report

এই Module-এ আমরা Estimate, Package Estimate, Bill of Quantity (BOQ), Schedule of Works (Tender Schedule), Item of Work (IOW)-এর Analysis, ইত্যাদির বিভিন্ন ধরনের Printing পদ্ধতি নিয়ে আলোচনা করবো ।

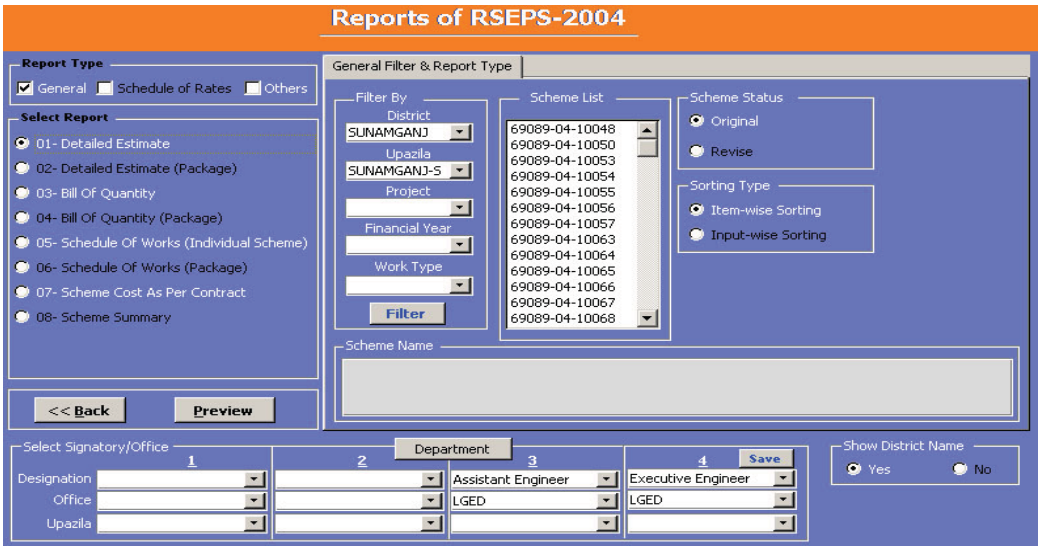
এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- বিভিন্ন Option ব্যবহার করে কিভাবে Estimate, Package Estimate Print করা যায় ।
- Schedule of Works (Tender Schedule) কিভাবে Print করা যায় ।
- কিভাবে Item of Work (IOW)-এর Analysis ও Schedule of Rates সংক্রান্ত অন্যান্য Report Print করা যায় ।
- এই সকল Report Print করার সময় কিভাবে Signatory Select করা যায় ।
- এছাড়া RSEPS Software হতে প্রাপ্ত অন্যান্য Report ।

RSEPS Software হতে প্রাপ্ত বিভিন্ন ধরনের Output Format-কে আমরা Report বলে থাকি । সাধারনতঃ Report সমূহ আমরা Report Generation Option থেকে পেয়ে থাকি। বিভিন্ন ধরনের Option ব্যবহার করে উক্ত Report সমূহ Print করার পদ্ধতি এখানে আলোচনা করা হলো ।

■ Report Generation ঃ

Switch Board-এর "**Reports Generation**" Button-টি Click করে Report-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



এখানে Report Type ফ্রেমে General, Schedule of Rates এবং Others এই ৩ ধরনের Report Type দেখা যাচ্ছে । Report Type গুলি পরিবর্তন করার সাথে সাথে Report List এবং Screen-টির ডান দিকের অংশটি Report অনুযায়ী পরিবর্তিত হতে থাকবে । বিভিন্ন Type অনুযায়ী Report তালিকাটি নিম্নরূপ ঃ

General:
01- Detailed Estimate
02- Detailed Estimate (Package)
03- Bill Of Quantity
04- Bill Of Quantity (Package
05- Schedule Of Works (Individual Scheme)
06- Schedule Of Works (Package)
07- Scheme Cost As Per Contract
08- Scheme Summary

Schedule of Rates:
01- Item Of Works and Schedule Of Rates
02- Item Of Works with Unit Cost Analysis
03- Basic Item List & Rates
04- List of Basic Item under Selective IOW

Others:
01- List of Additional Item
02- Project List
03- Pourashava List

■ **General Reports :**

- প্রয়োজনীয় Report-টি Select করতে হবে ।
- List থেকে Scheme/Package-টি Select করতে হবে । List সংক্ষিপ্ত করার জন্য Filter Option ব্যবহার করা যেতে পারে ।
- বিভিন্ন Report Select করার সাথে সাথে Report-টির জন্য প্রযোজ্য Option সমূহ পরিবর্তিত হতে থাকে, যার প্রতিটির ১টি Default Value থাকে ।
- এখান থেকে পছন্দমাফিক Option Select করা যাবে ।
- অবশেষে **Preview** Button-টি Click করে Report-টি দেখা যাবে অতঃপর Print করা যাবে ।

Option সমূহ নিয়ে নিম্নে আলোচনা করা হলো ঃ

Scheme Status:

এই Option-টি Estimate ও BOQ এর ক্ষেত্রে পাওয়া যাবে ।

Origial: Original Estimate/BOQ-টি Preview/Print হবে ।

Revise: Revised Estimate/BOQ-টি Preview/Print হবে । একাধিকবার Revise-এর ক্ষেত্রে Revise Status Select করতে হবে ।

Sorting Type:

এই Option-টি Estimate, BOQ ও Schedule of Works এর ক্ষেত্রে পাওয়া যাবে ।

Item-wise Sorting: Preview/Print এর সময় Item-গুলি Item Code অনুযায়ী Sorting হবে ।

Input-wise Sorting: Estimate তৈরির সময় যে ধারাবাহিকতায় Item-গুলি Input করা হয়েছে Preview/Print এর সময় সেই Serial অনুযায়ী Sorting হবে ।

Tender Notice, Group:

এই Option-টি Schedule of Works এর ক্ষেত্রে পাওয়া যাবে । এখানে Tender Notice No, Tender Group No Type করে দেওয়া যাবে ।

Quote Type:

এই Option-টি Schedule of Works এর ক্ষেত্রে পাওয়া যাবে ।

With Rate: Item-এর Quantity, Rate, Amount সহ Schedule of Works Preview/Print হবে ।

Without Rate: শুধুমাত্র Item এর Quantity দিয়ে Schedule of Works Preview/Print হবে, Rate ও Amount-এর ঘর খালি থাকবে ।

Report Type:

এই Option-টি Schedule of Works (Package) এর ক্ষেত্রে পাওয়া যাবে ।

Scheme Wise: Package-এ ব্যবহৃত Scheme (Estimate)-সমূহ Part-A, Part-B, ... হিসাবে এসে Schedule of Works Preview/Print হবে ।

Item Wise: Package-এ ব্যবহৃত Scheme (Estimate)-সমূহের Item অনুসারে Schedule of Works Preview/Print হবে । একই Item একাধিক Estimate-এ ব্যবহৃত হয়ে থাকলে তার Quantity একত্রিত হয়ে আসবে এবং Scheme ওয়ারী Quantity-এর Break-up দেখা যাবে ।

Show Sch. Name in each page:

এই Option-টি Schedule of Works এর ক্ষেত্রে পাওয়া যাবে । Schedule এর প্রতি পাতায় Scheme-এর নাম দেখানোর জন্য উক্ত Option-টিতে Yes Select করতে হবে ।

Department Name:

Default-ভাবে এখানে LGED Selected থাকে কিন্তু যে Estimate-টি তৈরি করা হচ্ছে সেটি যদি অন্য কোন দপ্তরের হয়ে থাকে সেক্ষেত্রে Department Button-টি Click করে সেই দপ্তরের নাম Type করে দিতে হবে ।

Estimate এর উপরে Department Name টি এখান থেকেই প্রদর্শিত হয়ে থাকে ।

Signatory Selection:

Estimate/Schedule of Works ইত্যাদিতে স্বাক্ষর প্রদানের জন্য স্বাক্ষরকারীবৃন্দের Designation, office ইত্যাদি Select করা যায় । **Save** Button-টি Click করে উক্ত Selection সংরক্ষণ করা যায় ।

Show District Name:

স্বাক্ষর এর নীচে জেলার নাম দেখাতে চাইলে Yes অথবা না চাইলে No Select করতে হবে ।

Scheme Summary:

এই Report-টি থেকে RSEPS Software-এ সংরক্ষিত Estimate জেলা, উপজেলা, Work Typeওয়ারী Summary Information পাওয়া যাবে ।

প্রয়োজনে অর্থবছর, জেলা, উপজেলা, Project, Work Type দ্বারা Report-টি Filter করা যাবে ।

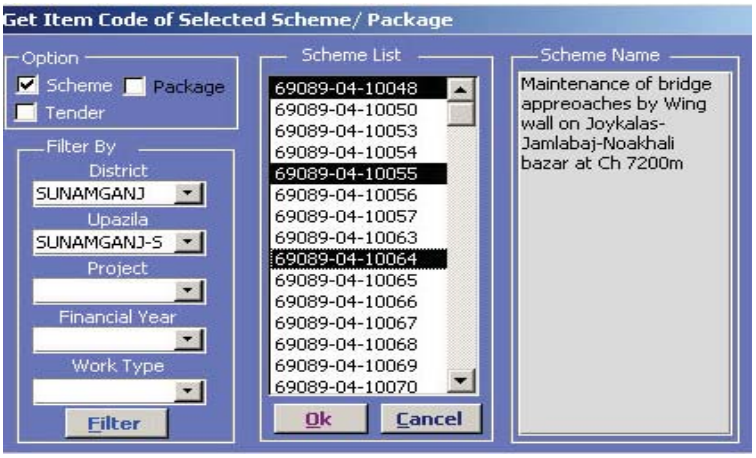
■ Schedule of Rates related Reports :

- প্রয়োজনীয় Report-টি Select করতে হবে ।
- প্রয়োজন অনুযায়ী জোন, অর্থবছর, Chapter Select করতে হবে ।
- অবশেষে **Preview** Button-টি Click করে Report-টি দেখা যাবে অতঃপর Print করা যাবে ।

Note:
- Item of Work (IOW)-এর দর ছাড়া শুধু Quantity দিয়ে Analysis Preview/Print করতে চাইলে Without Rate Box-এ টিক দিতে হবে।
- শুধুমাত্র কিছু Selective IOW-এর Report Preview/Print করতে চাইলে Print With Selective IOW-এর ঘরে প্রয়োজনীয় Item-এর কোড সমূহ কমা (,) দ্বারা Seperate করে Input করতে হবে ।

Pick IOW Code Button এর কার্যকারিতা ঃ

Print With Selective IOW-এর ঘরে Item কোড Type না করে উক্ত Button-টি Click করে নিম্নোক্তভাবে সহজেই কিছু Scheme, Package বা Tender-এর Item কোড সরাসরি আনয়ন করা যায় ঃ



উক্ত Screen-টিতে পছন্দ অনুযায়ী Scheme(s), Package(s) বা Tender(s) Select করে **OK** Button-টিতে Click করলে Select-কৃত Scheme(s)/ Package(s)/Tender(s) এ ব্যবহৃত Item-এর কোড সমূহ Autometically IOW-এর ঘরে চলে যাবে ।

বিবিধ

Overview

- Project Add/Edit করার পদ্ধতি
- Pourashava Add/Edit করার পদ্ধতি
- প্রয়োজনে RSEPS থেকে Estimate Delete করার পদ্ধতি

এই Module-এ আমরা Project, Pourashava Add/Edit ইত্যাদি নিয়ে আলোচনা করবো।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Project Add/ Edit করা যায় ।
- কিভাবে Pourashava Add/ Edit করা যায় ।
- প্রয়োজনে RSEPS Software থেকে কিভাবে Estimate Delete করা যায়।

■ Project List :

Estimate তৈরির সময় Project-এর নাম Select করার প্রয়োজন পড়ে । যদি কাঙ্খিত Project-টির নাম Project List-এ না থাকে সেইক্ষেত্রে তা যোগ করে নিতে হবে ।

Switch Board-এর "**RSEPS**" Menu থেকে "**Project List**" Sub-Menu-টি Click করে Project List-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ

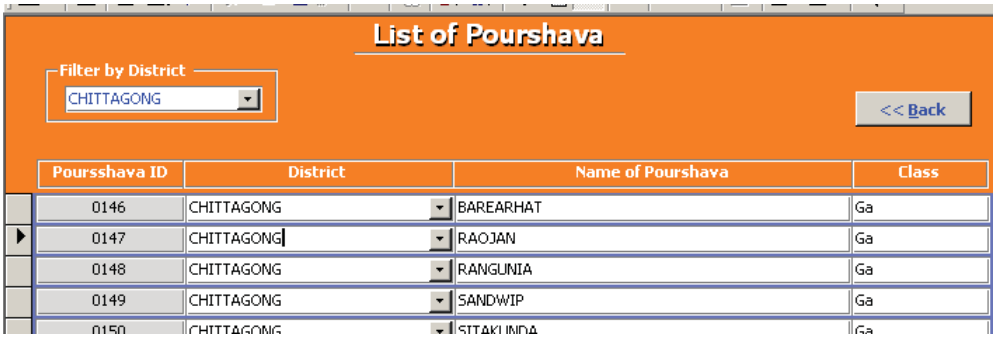
Project ID	Short Name	Name of Project	Show in List
049	ACP-4	4th Aquan Culture Project	☑
036	FDRP	ADB assisted 1998 Flood Damage Rehabilitation Project1	☑
011	ADIP	Agricultural Diversification and Intensification Project	☑
035	ACD	Aqua Culture Development	☑
107	ADP	Aquaculture Development Project (IFAD)	☑
104	BPJB SMALL H	Barisal,Patuakhali , Jhalokati and Barguna Small Holde	☑
040	BRMCR	Begum Rokeya Memorial Centre Connecting Road and Link	☑
088	BRMCCR & LRDP	Begum Rokeya Memorial Centre CR & LRDP	☑
050	BIP	Bhola Irrigation Project	☑
048	SREP	Bio-diversity Conservation in the Sundarbans Reserved	☑

- Project **Add** করতে হলে Menu থেকে *New Record* অথবা Record Navigation-এর *New Record* Button-টি Click করতে হবে । অতঃপর Project-টির Short ও সম্পূর্ন নাম Input করতে হবে ।
- প্রয়োজনে কোন Project এর নাম **Edit** করা যাবে ।
- কোন Project এর নাম Project List-এ না দেখতে চাইলে উক্ত Project-এর বিপরীতে *Show in List* কলামে টিক উঠিয়ে দিতে হবে ।

■ Project List :

Pourashava-এর Estimate তৈরির সময় তার নাম Select করার প্রয়োজন পড়ে । যদি কাঙ্খিত Pourashava-টির নাম Pourashava List-এ না থাকে সেইক্ষেত্রে তা যোগ করে নিতে হবে ।

Switch Board-এর "**RSEPS**" Menu থেকে "**Pourashava List**" Sub-Menu-টি Click করে Pourashava List-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



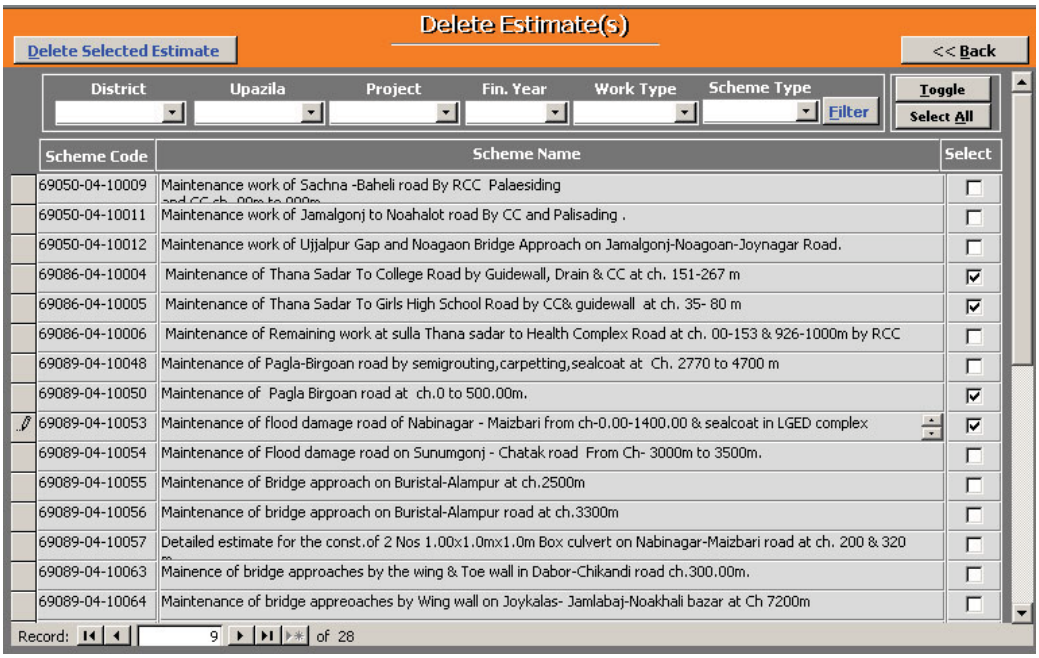
Poursshava ID	District	Name of Pourshava	Class
0146	CHITTAGONG	BAREARHAT	Ga
0147	CHITTAGONG	RAOJAN	Ga
0148	CHITTAGONG	RANGUNIA	Ga
0149	CHITTAGONG	SANDWIP	Ga
0150	CHITTAGONG	SITAKUNDA	Ga

- Pourashava **Add** করতে হলে Menu থেকে *New Record* অথবা Record Navigation-এর *New Record* Button-টি Click করতে হবে । অতঃপর Pourashava-টির জেলা, নাম, শ্রেণী Input করতে হবে ।
- **Filter by District** থেকে জেলা অনুযায়ী Pourashava Filter করা যাবে ।

■ Deleting Estimate :

অপ্রয়োজনীয় Estimate সমূহ RSEPS Software থেকে মুছে ফেলতে হলে উক্ত Option-টি ব্যবহার করতে হবে ।

Switch Board-এর "**Delete Estimate**" Button-টি Click করে Report-এর Screen-টি Open করা যাবে । Screen-টি নিম্নরূপ ঃ



- যে সকল Estimate সমূহ মুছে ফেলতে ইচ্ছুক সেই সকল Estimate-এর বিপরীতে *Select* কলামে টিক দিতে হবে ।
- অতঃপর "**Delete Selected Estimate**" Button-টি Click করতে হবে ।

Note: সম্পূর্নভাবে নিশ্চিত না হয়ে কখনই Estimate মুছে ফেলা উচিত না । কেননা, একবার মুছে ফেলার পর Estimate(s) আর ফেরৎ পাওয়া সম্ভব নয় ।

EVCS

Introduction

সড়ক উন্নয়ণ ও প্রশস্তকরনের লক্ষ্যে প্রতিবছর এলজিইডির বিভিন্ন প্রকল্প/কর্মসূচীর আওতায় অসংখ্য মাটির কাজের স্কীম নেওয়া হয়ে থাকে । এসকল স্কীমের জন্য প্রযোজ্য মাটির Volume Manually Calculate করা অত্যন্ত কঠিন, শ্রমসাধ্য ও সময় সাপেক্ষ ব্যাপার । তদুপরি Calculation-এ ভুলের সম্ভাবনাও থাকে প্রতিনিয়ত । এ জাতীয় কাজ সহজীকরনের নিমিত্তে Earth Volume Calculation System (EVCS) Software-টি Develop করা হয়েছে ।

EVCS অন্যান্য Windows base application (যেমন ঃ MS-Word, Ms-Excel) এর মত ১টি User Friendly Software, যেখানে Menu/Tool bar এর মাধ্যমে Software-টির সকল কার্যক্রম পরিচালিত হয়ে থাকে । এছাড়া এখানে Mouse এর Right Button Click করে কিছু নির্দিষ্ট Command সম্বলিত Pop-up Menu পাওয়া যাবে যার মাধ্যমে Menu/Tool bar এর কার্যক্রম পরিচালনা করা যাবে ।

Software-টির মাধ্যমে খুব সহজেই Survey-কৃত Data Input/Edit করা যায় যেখানে Software-টি নিজেই প্রয়োজনীয় Data সমূহের Validation Check করে এবং একই সাথে ভুল তথ্য সংশোধন/ প্রয়োজনীয় তথ্য প্রদানের জন্য ব্যবহারকারীকে অবহিত করে । এছাড়া ব্যবহারকারী Input-কৃত তথ্য Save করতে ভুলে গেলেও Auto Save প্রক্রিয়ায় Software-টি নিজেই তথ্য Save করে থাকে ।

Software-টি মাটির Volume, Allied Item সম্বলিত Summary Sheet, Wheat Sheet/Taka Sheet-এর পাশাপাশি Cross Section, Longitudinal Profile এর গ্রাফও প্রদান করে থাকে যেখানে প্রয়োজনবোধে গ্রাফের Presentation Format ব্যবহারকারী Customize করে নিতে পারে ।

এছাড়া Software-টিতে Security পদ্ধতি প্রয়োগ করা হয়েছে যার ফলে অযাচিত ব্যবহার রোধ সহ কিছু Restricted অংশে (যেমন ঃ Rate Update) সাধারন ব্যবহারকারীদের অনুপ্রবেশ রোধ করা সম্ভব ।

Technical Specification

EVCS Software-টি 32-bit Windows Operating System এ ব্যবহারের লক্ষ্যে তৈরি করা হয়েছে । Programming Language Visual Basic 6.0 দ্বারা EVCS Software-টি তৈরি করা হয়েছে যেখানে Reporting Tool হিসাবে Crystal Report ব্যবহার করা হয়েছে ।

তথ্য/উপাত্তসমুহ সংরক্ষণের জন্য Microsoft Jet Database Engine ব্যবহার করা হয়েছে তবে ব্যবহারকারীর Computer-এ Microsoft Access থাকা বাঞ্ছনীয় নয় । Database File টিকে Server-এ রেখে Software টি Client-Server environment এ ব্যবহার করা সম্ভব । Software ব্যবহার করার জন্য নিম্নলিখিত Software/ Hardware environment প্রয়োজন ঃ

- Software environment:
  Operating System (OS): Windows family
  (Windows 98, Windows NT, Windows 2000/ XP)

- Hardware environment:
  CPU : Pentium-I or above
  RAM : 64 MB or above (depending on OS)

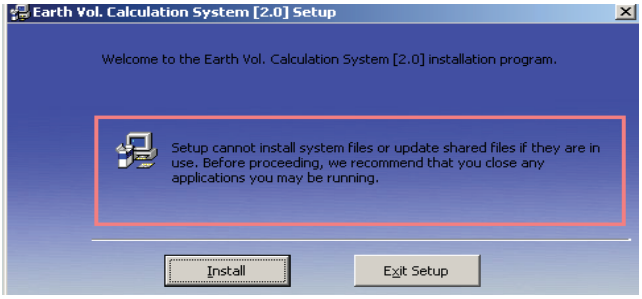
Installation of EVCS

EVCS-এর Installation পদ্ধতি অন্যান্য Windows base application Installation এর মতই।

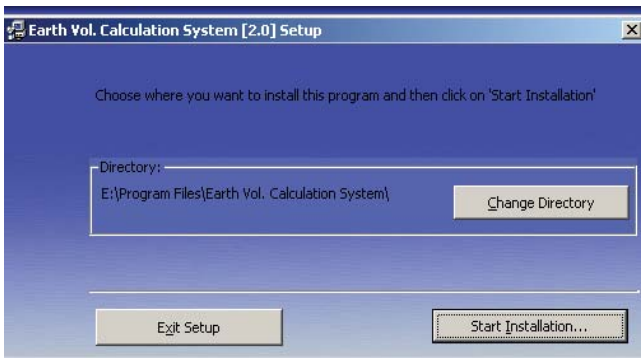
এজন্য CD-টির মধ্যে অবস্থিত Setup.exe 

File-টিকে Double-click করতে হবে । অতঃপর নিম্নপ্রদর্শিত পদ্ধতি অনুসরন করতে হবে ।

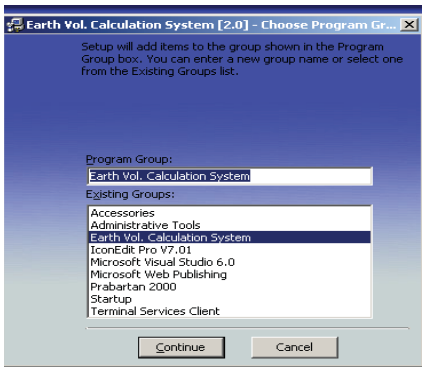
- Welcome Screen-টি আসবে । এখানে **Install** Button-টি Click করতে হবে ।



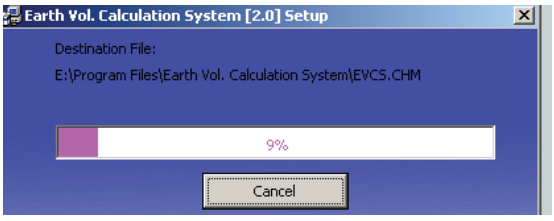
- Software-টি Install-এর Directory/Path সম্বলিত Screen-টি আসবে । প্রয়োজনে উক্ত Directory পরিবর্তন করা যাবে ।
- অতঃপর **Start Installation...** Button-টি Click করতে হবে ।



- এখানে **Continue** Button-টি Click করতে হবে ।

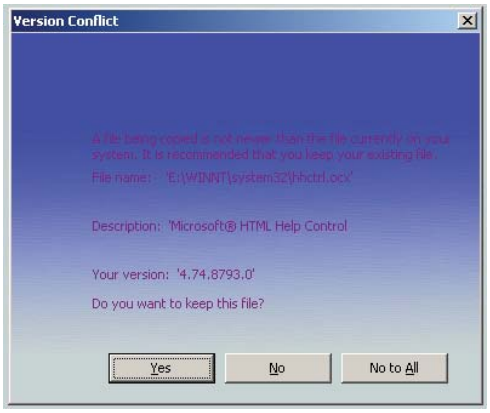


- এখন Installation Progress দেখা যাবে ।



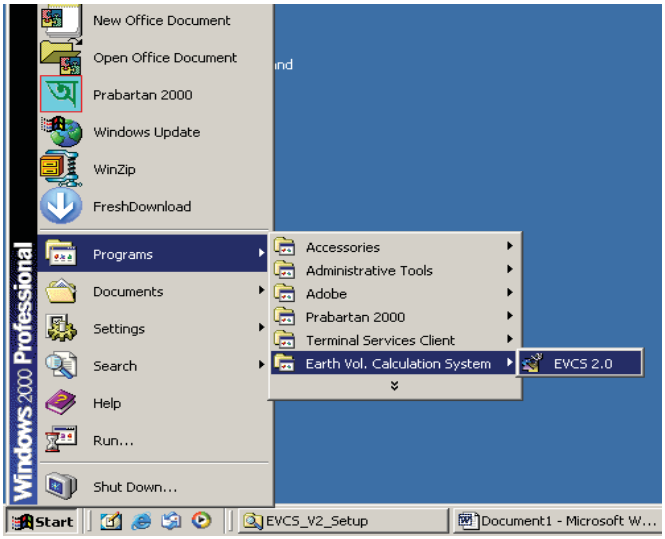
- Installation-এ ব্যবহৃত কোন File এর সাথে Computer-এ অবস্থিত কোন File এর Version Conflict করলে উক্ত Message-টি আসবে ।

- এখানে **No to All** Button-টি Click করা যেতে পারে ।



- অবশেষে Installation Complete Message পাওয়া যাবে ।

- Install হওয়ার পর ডান দিকে প্রদর্শিত স্থান থেকে Software-টি Run করা যাবে ।



▶▶ প্রয়োজনে নিম্নলিখিত পদ্ধতিতে Desktop-এ Software-টির Short-cut তৈরি করা যেতে পারে যেখান থেকে সহজেই Software-টি Run করা যাবে ।

- **Programs >> Earth Vol. Calculation System >> EVCS 2.0** Icon-টিতে Mouse এর Right Button Click করুন ।
- এবার **Send To >> Desktop** (create shortcut) Icon-টিতে Click করুন ।
- দেখা যাবে Desktop-এ Software-টির Short-cut তৈরি হয়ে গেছে ।

Menu Bar এবং Tool Bar পরিচিতি

Overview

- Menu Bar পরিচিতি এবং এর কার্যকারিতা
- Tool Bar পরিচিতি এবং এর কার্যকারিতা
- Popup Menu
- Hot Key এবং তার ব্যবহারিতা

Software টির সকল কার্যক্রম Menu Bar, Tool Bar এবং কিছু Command Button এর মাধ্যমে পরিচালিত হয় । কাজেই Software টি পরিচালনা করতে হলে উপরোক্ত বিষয়ের ব্যবহার পদ্ধতি জানা আবশ্যক । এই Module এ আমরা Menu Bar, Tool Bar এবং Popup Menu নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

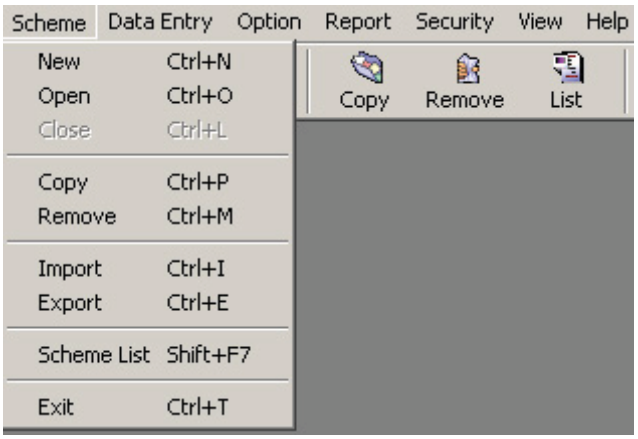
- Menu Bar এর কোন Menu Select করে কোন ধরনের কাজ করা যায় ।
- Tool Bar এর কোন Tool Select করে কোন ধরনের কাজ করা যায় ।
- Popup Menu কিভাবে পাওয়া যায় ।

এবং

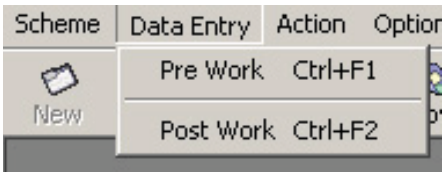
- Hot Key বলতে কি বুঝায় এবং তা ব্যবহার করে কিভাবে কাজ দ্রুততর করা যায় ।

Menu Bar:

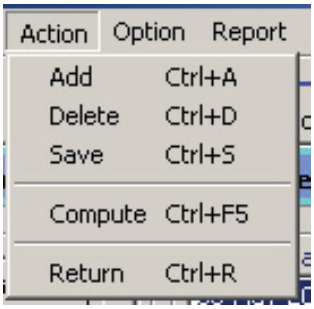
Software-টি Open করলে Scheme, Data Entry, Option, Report, Security, View ও Help নামক Menu সমূহ দেখা যাবে । প্রতিটি Menu-এর Sub-Menu আছে যার কার্যকারিতা স্ব-ব্যাখ্যায়িত। নীচে Menu/Sub-Menu সমূহের চিত্র প্রদর্শিত হলো ।



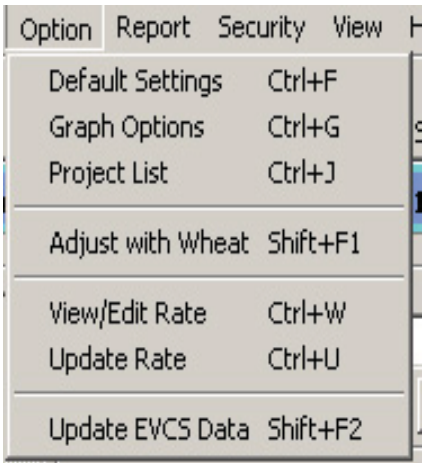
Sub-Menu under Scheme Menu



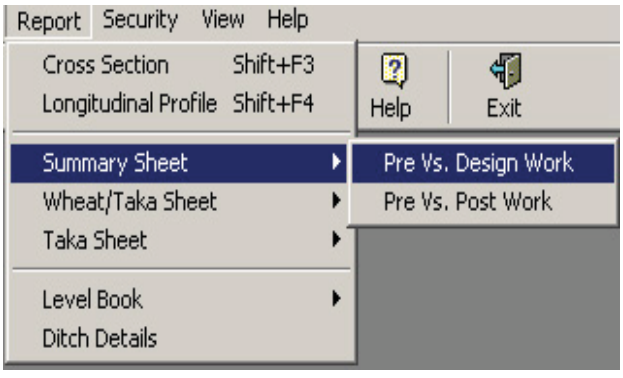
Sub-Menu under Data Entry Menu



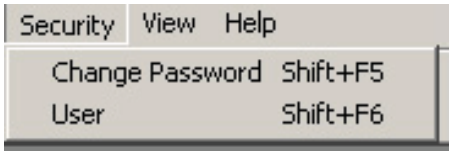
Sub-Menu under Action Menu



Sub-Menu under Option Menu



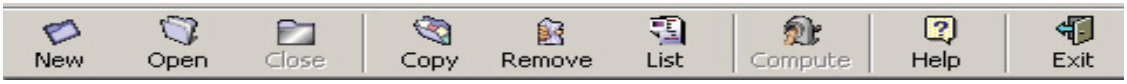
Sub-Menu under Report Menu



Sub-Menu under Security Menu

▸▸ Tool Bar (General):

সচরাচর ব্যবহৃত Sub-Menu সমূহের কার্যক্রম Tool Bar দ্বারা পরিচালনা করা যায় । নীচে Tool Bar সমূহের চিত্র প্রদর্শিত হলো যার কার্যকারিতা স্ব-ব্যাখ্যায়িত ।



(Tool Bar : কোন Scheme Open এর পূর্বে)

(Tool Bar : কোন Scheme Open এর পরে)

▸▸ Sub-Menu/Tool Bar সমূহের কার্যকারিতা ঃ

- ❑ ***Scheme Menu***
  - ▭ **New:** মাটির কাজের নতুন Scheme তৈরির জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Open:** সংরক্ষিত Scheme Open করার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Close:** Open-কৃত Scheme Close করার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Copy:** কোন Scheme-এর অবিকল আরেকটি Copy তৈরি করার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Remove:** Scheme(s) মুছে ফেলার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Import:** অন্য Computer থেকে Export-কৃত Scheme(s) Import করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - ▭ **Export:** অন্য Computer-এ ব্যবহার করার জন্য Scheme(s) Export করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - ▭ **Scheme List:** Software-টিতে সংরক্ষিত Scheme-এর দেখা/Print করার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
  - ▭ **Exit:** Software-টি থেকে বের হওয়ার জন্য উক্ত Sub-Menu/Tool-Bar ব্যবহার করতে হবে ।
- ❑ ***Data Entry Menu***
  - ▭ **Pre Work:** Pre-Work-এর Data Entry Screen Open করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - ▭ **Post Work:** Post-Work-এর Data Entry Screen Open করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।

- ***Action Menu***
  - **Add:** Pre-Work-এর Survey Data Entry করার সময় Section Add করার জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।
  - **Delete:** কোন Section মুছে ফেলার জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।
  - **Save:** Input-কৃত Data Save করার জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।
  - **Compute:** Input-কৃত Survey Data-এর প্রেক্ষিতে Scheme-টির জন্য প্রযোজ্য মাটির Volume বের করার জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।
  - **Return:** Open-কৃত Screen Close করার জন্য উক্ত Sub-Menu/ Tool-Bar ব্যবহার করতে হবে ।

- ***Option Menu***
  - **Default Settings:** Software-টির কিছু Default Value Set করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Graph Options:** Graph Customize করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Project List:** Project-এর তালিকা দেখা ও প্রয়োজনে Add/Edit করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Adjust with Wheat:** বরাদ্দকৃত গমের প্রেক্ষিতে সড়কের দৈর্ঘ্য নির্ণয় করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Define Formation:** Input-কৃত সকল/Selected Section সমূহের Formation Level বাড়ানো/কমানোর জন্য উক্ত Sub-Menu ব্যবহার করতে হবে।
  - **View/Edit Rate:** মাটির কাজ, Allied-Item সমূহের দর দেখা/Edit করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Update Rate:** সদর দপ্তর হতে প্রেরিত দর Software-টিতে Update করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Update EVCS Data:** Software-টিতে ব্যবহৃত অন্যান্য Data Update করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।

- ***Report Menu***
  - **Cross Section:** X-Section Graph দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Longitudinal Profile:** Long-Profile Graph দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Summary Sheet:** Scheme-টির জন্য Section to Section অনুযায়ী মাটির Volume-এর Summary দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Wheat Sheet:** Scheme-টির জন্য প্রয়োজনীয় গমের পরিমান দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Taka Sheet:** Scheme-টির জন্য প্রয়োজনীয় টাকার পরিমান দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Level Book:** Level Book দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **Ditch Details:** Input-কৃত Ditch সমূহের Detail Measurement দেখা/Print করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।

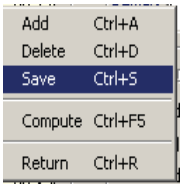
- ***Security Menu***
  - **Change Password:** Password পরিবর্তনের জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।
  - **User:** Software-টির জন্য ব্যবহারকারী Add/Edit করার জন্য উক্ত Sub-Menu ব্যবহার করতে হবে ।

Tool Bar (Graph):

Graph সমূহ Screen-এ প্রদর্শনের সময় নিম্নোক্ত Tool Bar-টি পাওয়া যায় যার Button সমূহের কার্যকারিতা বর্ণনা করা হলো ।

1. প্রদর্শিত Graph-টির Grid line show/hide করার জন্য
2. প্রদর্শিত Graph-টির Design portion show/hide করার জন্য
3. প্রদর্শিত Graph-টির Pre-work portion show/hide করার জন্য
4. প্রদর্শিত Graph-টির Post-work portion show/hide করার জন্য
5. Graph এর Option Set করার জন্য
6. প্রদর্শিত Graph-টি Fill করা/Fill উঠানোর জন্য
7. প্রদর্শিত Graph-টি Zoom করার জন্য
8. প্রদর্শিত Graph-টির Page Setup করার জন্য
9. প্রদর্শিত Graph-টি Print করার জন্য
10. প্রদর্শিত Graph-টি 'bitmap' আকারে Save করার জন্য
11. প্রদর্শিত Graph-টি Close করার জন্য

⏩ Popup Menu:



MS Windows এবং তার Environment-এ ব্যবহৃত বিভিন্ন Application Software-এ Mouse এর Right Button Click করে ডান দিকের Screen-এর মত কিছু নির্দিষ্ট Command সম্বলিত Menu পাওয়া যায়, এধরনের Menu-কেই Pop-up Menu বলা হয় ।

EVCS Software টিতেও এধরনের Pop-up Menu পাওয়া যাবে, যার মাধ্যমে Menu/Tool bar এর কার্যক্রম পরিচালনা করা যাবে ।

⏩ Hot Key এবং তার ব্যবহারিতা ঃ

MS Windows এবং তার Environment-এ ব্যবহৃত বিভিন্ন Application Software-এর অধিকাংশ Menu/Sub Menu/Button এর Caption এর কোন একটি অক্ষরের নিচে Underline করা থাকে (যেমন ঃ File Menu-এর ক্ষেত্রে F) । একইভাবে অধিকাংশ Sub Menu-এর Caption এর পাশে Command দেওয়া থাকে (যেমন ঃ Save-এর ক্ষেত্রে CTL+S) । Mouse-এর ব্যবহার না করে ALT+ সেই অক্ষর (যেমন ঃ **File Menu**-এর ক্ষেত্রে **ALT+F**) অথবা প্রদত্ত Command-টি ব্যবহার করে Keyboard এর সাহায্যে Data Entry সংক্রান্ত কাজ দ্রুততর করা যায় । একেই Hot Key বলে ।

EVCS Software-এর অধিকাংশ Menu/Sub Menu/Button এ Hot Key সংযোজন করা হয়েছে যেমন ঃ "**Scheme**" Menu-এর ক্ষেত্রে **S** (অর্থাৎ **ALT+S**), "Scheme" Menu-এর "**New**" Sub-Menu-এর ক্ষেত্রে **CTL+N** । একইভাবে অন্যান্য ক্ষেত্রেও এই পদ্ধতি ব্যবহার করে Data Entry সংক্রান্ত কাজ দ্রুততর করা যেতে পারে ।

Software-টিতে Log on, নতুন Scheme তৈরি, সংরক্ষিত Scheme Open/Close করার পদ্ধতি

Overview

- Software-টিতে Log on
- নতুন Scheme তৈরি
- সংরক্ষিত Scheme Open/Close

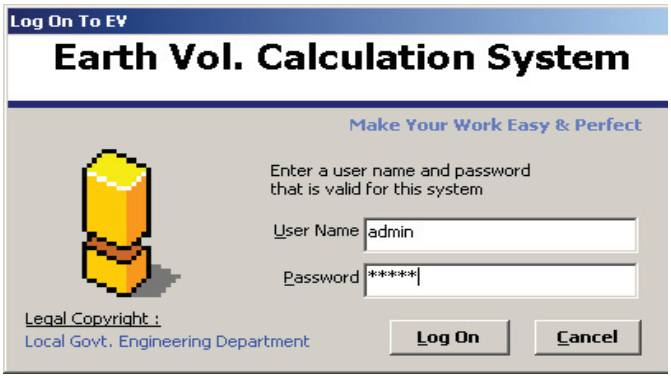
এই Module এ আমরা Software-টিতে Log on করা, নতুন Scheme তৈরি করা, পূর্বে তৈরিকৃত সংরক্ষিত Scheme Open/Close করার পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Software-টিতে Log on করা যায় ।
- কিভাবে ১টি নতুন Scheme তৈরি করা যায় ।
- কিভাবে পূর্বে তৈরিকৃত সংরক্ষিত Scheme Open করা যায় ।
- কিভাবে Open-কৃত Scheme Close করা যায় ।

▶▶ Software-টিতে Log on করা ঃ

EVCS Software-টি Run করার পর নিম্নোক্ত Log on Screen-টি পাওয়া যাবে ।



- এখানে User Name এবং Password করার Input পর **Log On** Button-টি Click করতে হবে ।
- Software-টিতে Default-ভাবে নিম্নলিখিত User-সমূহ ও Password দেওয়া থাকে ঃ

User Name	Password	Group
Admin	admin	Administrator
User-1	user1	General
User-2	user2	General

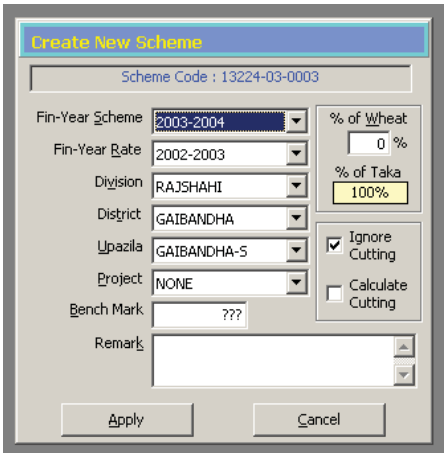
- Software-টিতে Log On করার পর প্রয়োজনবোধে Password পরিবর্তন করা যাবে।

> **Note :** শুধুমাত্র **Admin** User হিসাবে Log on করলেই দর পরিবর্তন, Data Update, User Add/Delete সংক্রান্ত কাজ করা সম্ভব ।

▶▶ নতুন Scheme তৈরি করা ঃ

নতুন Scheme তৈরি করার জন্য নিম্নোক্ত পদ্ধতি অনুসরন করতে হবে ।

- **Scheme** Menu থেকে **New** Sub-Menu অথবা Tool-bar থেকে **New** button-টি Click করতে হবে । অতঃপর পার্শ্বস্থ Screen-টি দেখা যাবে ।
- Screen-টিতে Division, District ইত্যাদি Default-ভাবে Selected থাকবে যা প্রয়োজনে পরিবর্তন করা যাবে ।
- এবার Bench Mark Input করতে হবে ।
- এবার অন্যান্য প্রয়োজনীয় Selection সম্পন্ন করে **Apply** button-টি Click করতে হবে ।

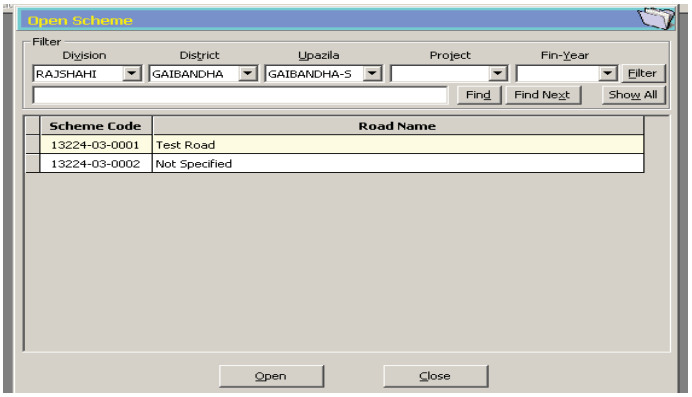


- অতঃপর নতুন Scheme সম্বলিত Pre-Work-এর Data Entry Screen-টি দেখা যাবে।

▶▶ সংরক্ষিত Scheme Open করা ঃ

পূর্বে তৈরিকৃত সংরক্ষিত Scheme Open করার জন্য নিম্নোক্ত পদ্ধতি অনুসরন করতে হবে ।

- **Scheme** Menu থেকে **Open** Sub-Menu অথবা Tool-bar থেকে **Open** button-টি Click করতে হবে । অতঃপর নিচের Screen-টি দেখা যাবে ।



- সংশ্লিষ্ট Scheme-টি Select করে *Scheme Code/Road Name*-এর উপর Double-click অথবা *Apply* button-টি Click করে Scheme-টি Open করা যাবে ।

▶▶ Open-কৃত Scheme Close করা ঃ

- **Scheme** Menu থেকে **Close** Sub-Menu অথবা Tool-bar থেকে **Close** button-টি Click করে Open-কৃত Scheme Close করা যাবে ।

Note :
- Division, District, Upazila ইত্যাদি দ্বারা Scheme List *Filter* করা সম্ভব।
- Scheme Code/Road Name-এর সম্পূর্ন/আংশিক অংশ Type করে *Find* button-এর মাধ্যমে কোন Scheme খুঁজে পাওয়া যেতে পারে ।
- একই Criteria মোতাবেক পরবর্তী Scheme খুঁজার জন্য *Find Next* buttonটি ব্যবহার করা যেতে পারে ।
- Software-টিতে সংরক্ষিত সকল Scheme দেখার জন্য *Show All* buttonটি ব্যবহার করা যেতে পারে ।

Pre/Post-work-এর Data Entry/Edit/Update করার পদ্ধতি

Overview

- Pre-Work এর Chainage/Section Add
- Survey এর Data Entry
- Flying Section Add
- Design, Allied-Item এর Data Entry
- NER, Ditch, Obstruction এর Data Entry
- Compute
- Post-Work এর Data Entry

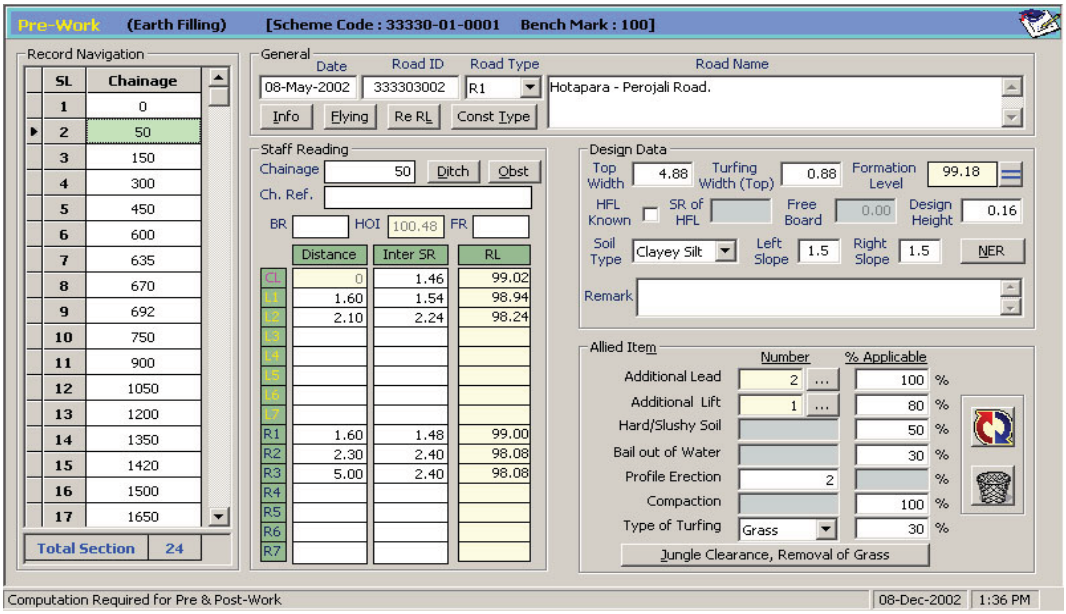
এই Module এ আমরা Survey, Design, Allied-Item ইত্যাদির Data Entry পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Pre-Work-এর Data Entry করা যায় ।
- কিভাবে Section Add, Design, Allited-Item-এর Data Entry করা যায় ।
- কিভাবে Flying Section Add, NER, Ditch, Obstruction-এর Data Entry করা যায়।
- কিভাবে Post-Work-এর Data Entry করা যায় ।

⏩ Pre-Work এর Data Entry Screen ঃ

Data Entry Menu থেকে **Pre Work** Sub-Menu Click করে Screen-টি পাওয়া যাবে । তবে নতুন Scheme তৈরির সময় Automatically Screen-টি Open হয় ।



⏩ Data Input/Edit করার পদ্ধতি ঃ

⌨ General:

এখানে Date, Road Code, Road Type, Road Name Input করতে হবে ।

সঠিক Road Code Input করার পর Road Database-টি যদি একই Computer-এ থাকে তবে Software-টি Automatically Road Type, Road Name Database থেকে নিয়ে আসবে ।

⌨ Section/Chainage Add/Delete/Save:

- **Action** Menu থেকে **Add** Sub-Menu অথবা Tool-bar থেকে **Add** button-টি Click করে Chainage Add করা যাবে ।
- **Action** Menu থেকে **Delete** Sub-Menu অথবা Tool-bar থেকে **Delete** button-টি Click করে Chainage Delete করা যাবে ।
- **Action** Menu থেকে **Save** Sub-Menu অথবা Tool-bar থেকে **Save** button-টি Click করে Data Save করা যাবে ।

⌨ Record Navigation:

Entry-কৃত Section/Chainage সমূহ এখানে দেখা যাবে । কোন Chainage এ Click করে সেই Chainage-এর Data দেখা/Edit করা যাবে ।

Note : Chainage Add বা এক Chainage থেকে অন্য Chainage-এ Move করার সময় Auto Save প্রক্রিয়ায় Software-টি নিজেই তথ্য Save করে থাকে ।

Staff Reading (SR):

এখানে Section সমূহের Survey-কৃত Data Input করা যাবে ।

- Chainage-এর ঘরে Survey সংশ্লিষ্ট Chainage Input করতে হবে ।
- প্রথম Section এর ক্ষেত্রে Height of Instrument (HOI) নির্ণয়ের জন্য প্রাপ্ত Back Reading (BR) Input করতে হবে ।
- Change Point এর ক্ষেত্রে Height of Instrument (HOI) নির্ণয়ের জন্য প্রাপ্ত Back Reading (BR) ও Fore Reading (BR) Input করতে হবে ।
- CL, L1, L2,..., R1, R2,... এর ঘরে সংশ্লিষ্ট Distance ও Staff Reading Input করতে হবে ।

Design Data:

এখানে Section সমূহের Design Data Input করতে হবে ।

- Design অনুযায়ী Top Width, Turfing Width (both side on top) Input করতে হবে ।
- Heighest Flood Level (HFL) জানা থাকলে তার Staff Reading ও Free Board অথবা Design Height Input করে Formation Level পাওয়া যাবে ।
- বর্তমান Section-টির Formation Level পূর্ববর্তী Section-এর সমান করতে চাইলে **=** button-টি Click করতে হবে । Software-টি Design Height Calculate করে নিবে ।
- Section-টির জন্য প্রযোজ্য Soil Type Select করতে হবে ।
- নতুন Section Add করলে Software-টি পূর্ববর্তী Section-এর Design Data Provide করে থাকে ।

Allied-Item:

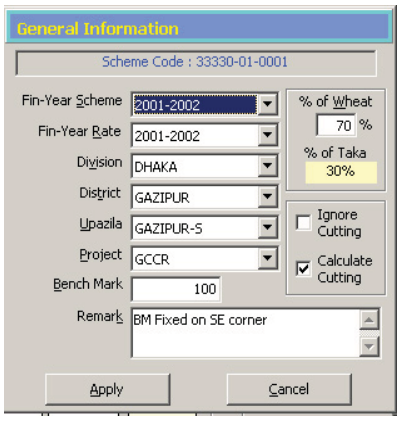
এখানে Section-টির জন্য প্রযোজ্য Allied-Item-এর Data Input করা যাবে ।

- **Lead/Lift:** সংশ্লিষ্ট **...** button-টিতে Click করলে Calculation Screen দেখা যাবে যেখানে Calculative Value প্রদান পূর্বক Lead/Lift-এর সংখ্যা নির্ধারন করা যাবে ।
- *Jungle Clearance, Removal of Grass* button-টিতে Click করে প্রাপ্ত Screen-এ এসংক্রান্ত তথ্য প্রদান করা যাবে ।
-  button-টিতে Click করে পূর্ববর্তী Section-এর Allied-Item Data আনা যাবে ।
-  button-টিতে Click করে বর্তমান Section-এর সকল Allied-Item Data মুছে ফেলা যাবে ।

General Information:

Info button-টি Click করে নিম্নোক্ত Screen-টি পাওয়া যাবে ।

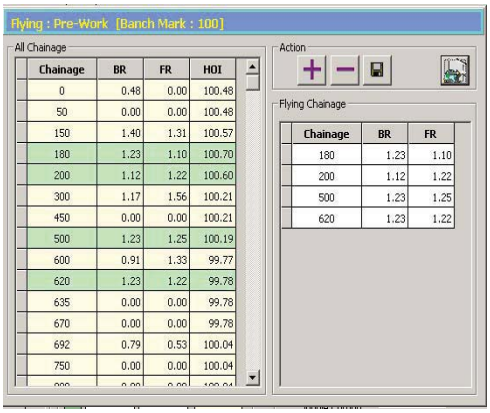
- এখানে তথ্য Edit করা যাবে ।
- Ignore Cutting Box-এ টিক দেওয়া থাকলে Software-টি Cutting অংশের মাটির Volume Calculate করবে না ।
- Calculate Cutting Box-এ টিক দেওয়া থাকলে Software-টি Cutting অংশের মাটির Volume Calculate করবে ।
- **Apply** button-টি Click করলে পরিবর্তিত তথ্য সমূহ Save হবে ।



Flying Section:

Flying button-টি Click করে নিম্নোক্তভাবে Flying Section সমূহের Data Input করা যাবে ।

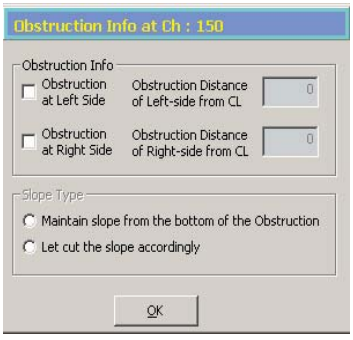
-  button-টি Click করে ১টি Section তৈরি করা যাবে । অতঃপর Chainage,BR,FR Input করতে হবে ।
-  button-টি Click করে ১টি Section মুছে ফেলা যাবে ।
-  button-টি Click করলে পরিবর্তিত তথ্য Save হবে ।
-  button-টি Click করে Back করা যাবে ।



Obstruction:

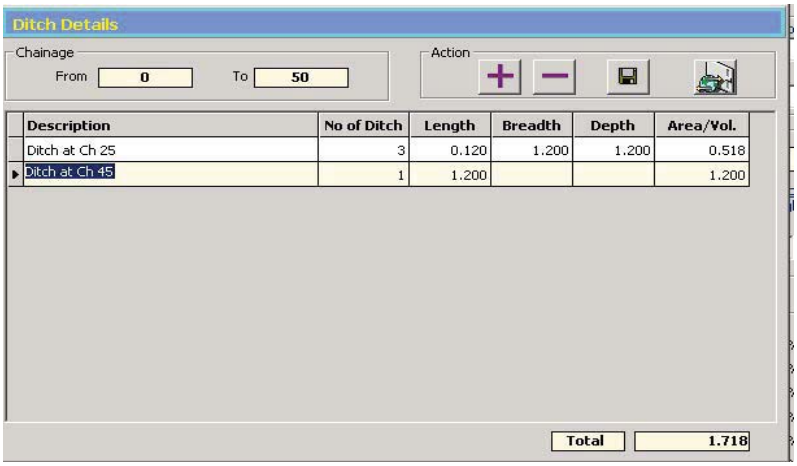
Obst button-টি Click করে নিম্নোক্তভাবে Obstruction-এর Data Input করা যাবে।

- Section-টির যেদিকে Obstruction আছে সেই সংশ্লিষ্ট Box-টিতে টিক দিয়ে CL থেকে Obstruction-এর দূরত্ত Input করতে হবে ।
- প্রযোজ্য Slope Type Select করতে হবে ।
- **OK** button-টি Click করতে হবে ।



Ditch/Extra Earth:

কোন Section-এ ছোট ছোট গর্ত থাকার ফলে সেসকল স্থানের মাটি ভরাটের পরিমান নির্ণয়ের জন্য **Ditch** button-টি Click করে নিম্নোক্তভাবে Ditch Section সমূহের Data Input করা যাবে ।

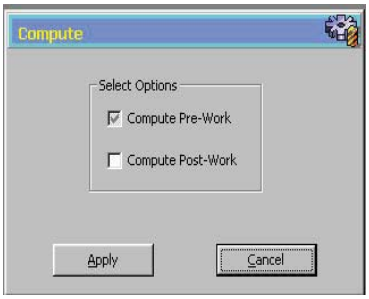


- button-টি Click করে একেকটি Record তৈরি করে তার Detailed Measurement প্রদান করা যাবে ।
- button-টি Click করে Record মুছে ফেলা যাবে ।
- button-টি Click করলে পরিবর্তিত তথ্য Save হবে ।
- button-টি Click করে Back করা যাবে ।

Compute

Survey Data Input করার পর মাটির Volume নির্ণয়ের জন্য Compute করা প্রয়োজন । **Action** Menu থেকে **Compute** Sub-Menu অথবা Tool-bar থেকে **Compute** button-টি Click করে উক্ত কাজটি করা যাবে ।

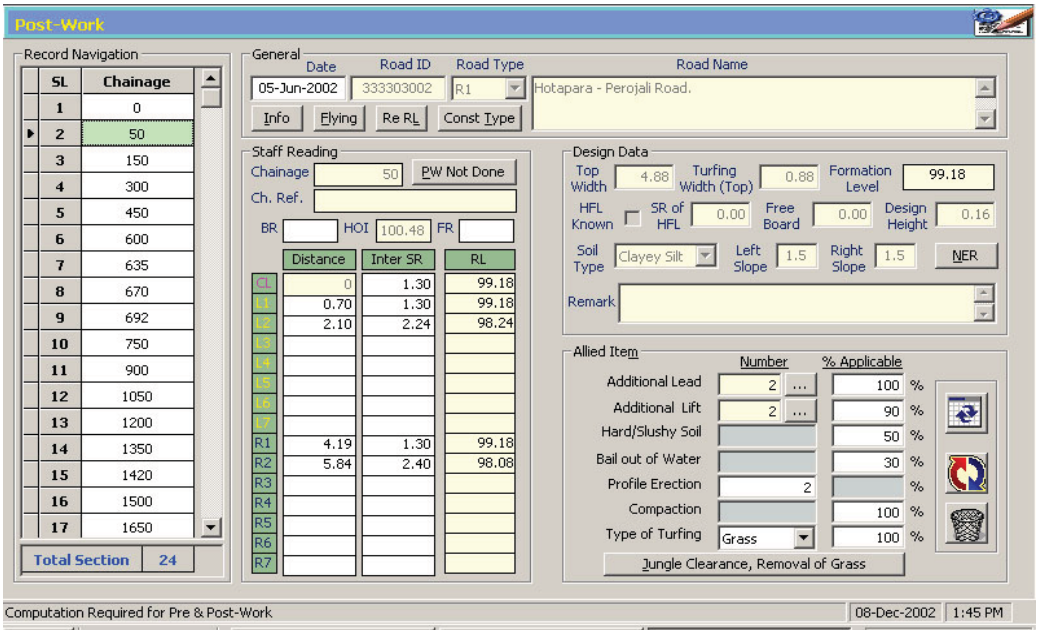
- সংশ্লিষ্ট Option Select করে **Apply** button-টি Click করতে হবে ।
- Compute করার সময় Data Entry-তে কোন Error খুঁজে পেলে Software-টি তা Report আকারে প্রকাশ করবে ।
- Error সমূহ সংশোধন করে পুনরায় Compute করতে হবে ।



Note : Software-টির Status Bar-এ Computation Required for Pre/Post Work লিখা থাকলে কোন Report Print নেওয়ার পূর্বে অবশ্যই Compute করে নিতে হবে নচেৎ Report-এর Computation Status: Required দেখা যাবে ।

⏩ Post Work ঃ

Data Entry Menu থেকে **Post Work** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।



Post Work-এর Data Entry পদ্ধতি Pre Work-এর মতই ।

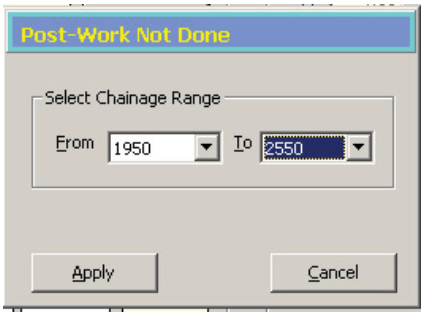
⌨ Allied-Item:

 button-টিতে Click করলে Pre Work-এর সকল Section-এর Allied-Item সমূহ Copy হয়ে Post-Work-এ Paste হয়ে যাবে ।

⌨ Post-Work Not Done:

স্কীমটি বাস্তবায়িত হওয়ার পর যদি পরিলক্ষিত হয় যে বাস্তবায়িত স্কীমের দৈর্ঘ্য প্রাক্কলিত দৈর্ঘ্যের তুলনায় কম সেক্ষেত্রে নিম্নলিখিতভাবে বাস্তবায়িত না হওয়া Section সমূহ বাদ দেওয়া যাবে ।

- **PW Not Done** button-টি Click করতে হবে ।
- বাস্তবায়িত না হওয়া Section Range Select করতে হবে ।
- **Apply** button-টি Click করতে হবে । অতঃপর Post-work Screen-এ সংশ্লিষ্ট Section-গুলি আর দেখা যাবে না ।



Note : ভুলবশতঃ বাদ দেওয়া Section সমূহ পুনরায় ফেরত আনতে চাইলে **PW Not Done** button-টি Click করতে হবে অতঃপর **Retrieve All Chainages** button-টি Click করতে হবে ।

Software-টির বিভিন্ন Option ও Security

Overview
- Default Settings
- Graph Option
- Project List
- View/Edit/Update Rate
- Create/Modify User

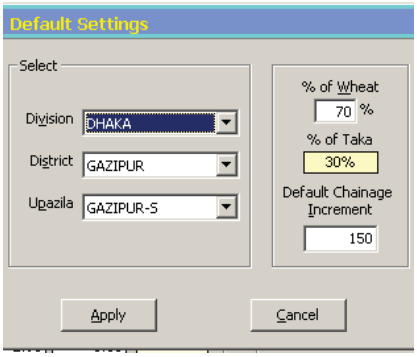
এই Module এ আমরা Software-টিতে প্রাপ্ত বিভিন্ন Option এবং Security নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- Default Settings এর মাধ্যমে কিভাবে Data Entry সংক্রান্ত কিছু কার্যক্রম সহজ করা যায় ।
- কিভাবে Graph-এর Presentation Format Customized করা যায় ।
- কিভাবে প্রকল্প Add/Edit করা যায় ।
- কিভাবে মাটির কাজ, Allied-Item সমূহের দর দেখা/Edit করা যায় ।
- কিভাবে সদর দপ্তর হতে প্রেরিত দর Software-টিতে Update করা যায় ।
- কিভাবে Software-টির ব্যবহারকারী Add/Edit এবং ব্যবহারকারীর Password পরিবর্তন করা যায় ।

▶▶ Default Settings ঃ

Option Menu থেকে **Default Settings** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।

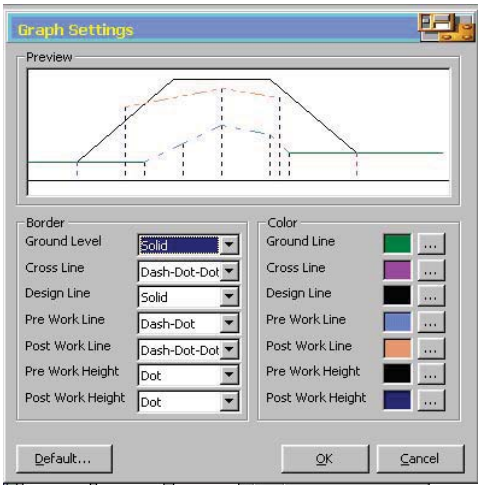


- প্রতিটি নতুন Scheme তৈরির সময় Division, District, Upazila Select করতে হয় । এখানে সংশ্লিষ্ঠ Division, District, Upazila Select করে রাখলে নতুন Scheme তৈরির সময় Software-টি Automatically তা Select করে নেয় ।
- সাধারণতঃ ১টি নির্দিষ্ট Interval পরপর Pre-Work এর Survey Section গুলি নেওয়া হয়ে থাকে । Default Chainage Increment-এর ঘরে সেই Interval-টি Input করলে প্রতিটি Section Add করার সময় Software-টি Automatically পূর্ববর্তী থেকে Section এর সাথে প্রদত্ত Value Add করে নতুন Section তৈরি করে থাকে ।
- % of Wheat-এর ঘরে Scheme এর জন্য প্রযোজ্য গম ও টাকার শতকরা হার নির্ধারন করে রাখা যায় ।
- **Apply** Button-টি Click করে যে কোন পরিবর্তন **Save** করে রাখা যাবে ।

▶▶ Graph Options ঃ

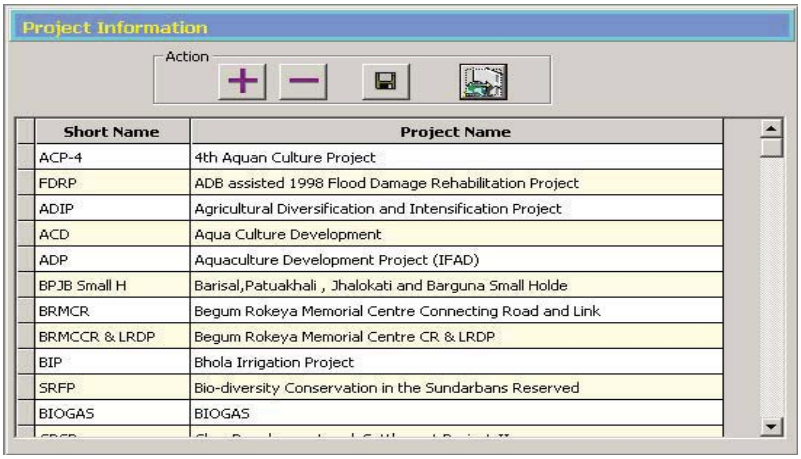
Option Menu থেকে **Graph Options** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।

- Graph সমূহ Screen-এ প্রদর্শনের নিমিত্তে Ground Level, Design Line, Pre-Work Line ইত্যাদির Line এর ধরন ও রং পছন্দ করা যাবে ।
- Option(s) Select করার পর **Default** button-টি Click করে Selection-সমূহ Permanently Save করা যাবে ।
- Option(s) Select করার পর **OK** button-টি Click করে Selection-সমূহ Program চলাকালীন সময়ের জন্য Save করা যাবে ।



▶▶ Project List ঃ

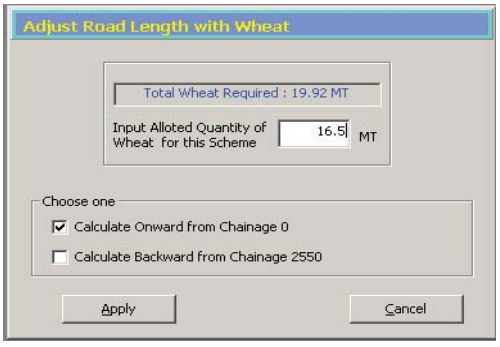
Option Menu থেকে **Project List** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।



- এখানে প্রকল্প Add/Edit/Delete করা যাবে ।

▶▶ Adjust with Wheat ঃ

Option Menu থেকে **Adjust with Wheat** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।



চিত্র- ১

চিত্র- ২

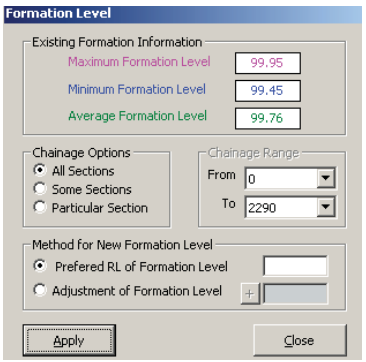
প্রাক্কলিত স্কীমের তুলনায় বরাদ্দকৃত গমের পরিমান কম হলে উক্ত Option-টির মাধ্যমে বরাদ্দকৃত গমের প্রেক্ষিতে সড়কের দৈর্ঘ্য নির্ণয় করা যাবে ।

- প্রথমে বরাদ্দকৃত গমের পরিমান Input করতে হবে । অতঃপর সড়কটির Starting Point থেকে Calculate করতে চাইলে *Calculate Onward* .... এ টিক দিতে হবে অথবা Ending Point থেকে Calculate করতে চাইলে *Calculate Backward* .... এ টিক দিতে হবে ।
- এখন **Apply** button-টি Click করলে Software-টি Calculation শুরু করবে ও চিত্র-২ এর মত Calculation Result প্রদান করবে ।
- এখন Choose one ফ্রেম থেকে যে কোন ১টি Option Select করে প্রক্রিয়াটি শেষ করা যাবে ।

▶▶ Define Formation ঃ

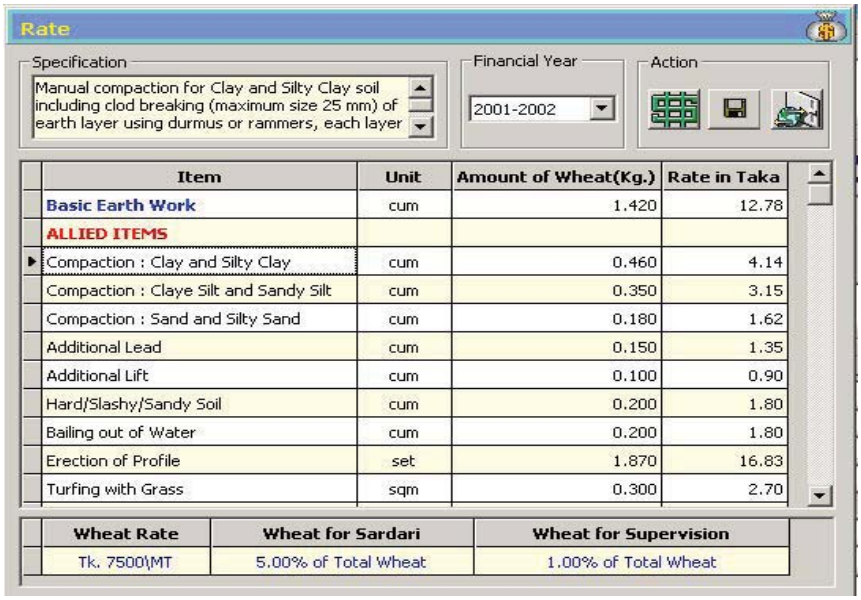
Option Menu থেকে **Define Formation** Sub-Menu Click করে Screen-টি পাওয়া যাবে।

- এখানে All Sections/Some Sections/Particular Section ও Section Range Select করে, ১টি নির্দিষ্ট Formation Level প্রদান করে **Apply** button-টি Click করে Selected Section সমূহকে একই Formation Level এ নিয়ে যাওয়া যাবে অথবা +/- Value দ্বারা Selected Section সমূহের Formation Level কে Adjust করা যাবে ।



▶▶ View/Edit Rate ঃ

Option Menu থেকে **View/Edit Rate** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।



Item	Unit	Amount of Wheat(Kg.)	Rate in Taka
Basic Earth Work	cum	1.420	12.78
ALLIED ITEMS			
Compaction : Clay and Silty Clay	cum	0.460	4.14
Compaction : Claye Silt and Sandy Silt	cum	0.350	3.15
Compaction : Sand and Silty Sand	cum	0.180	1.62
Additional Lead	cum	0.150	1.35
Additional Lift	cum	0.100	0.90
Hard/Slashy/Sandy Soil	cum	0.200	1.80
Bailing out of Water	cum	0.200	1.80
Erection of Profile	set	1.870	16.83
Turfing with Grass	sqm	0.300	2.70

Wheat Rate	Wheat for Sardari	Wheat for Supervision
Tk. 7500\MT	5.00% of Total Wheat	1.00% of Total Wheat

- ❑ এখানে মাটির কাজ, Allied-Item সমূহের বিভিন্ন অর্থবছর অনুযায়ী দর দেখা ও প্রয়োজনে দর (Taka) Edit করা যাবে ।
- ❑ button-টি Click করে Edit কৃত Data Save করা যাবে ।

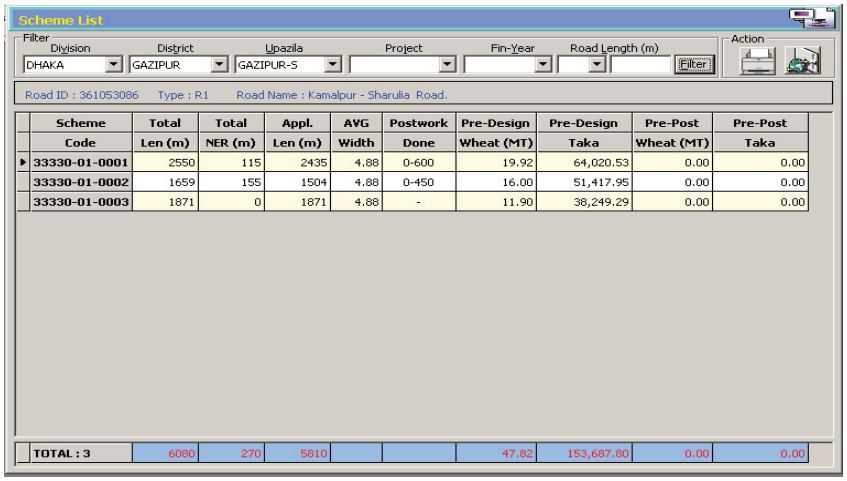
▶▶ Update Rate/ Update EVCS Data ঃ

Option Menu থেকে সংশ্লিষ্ট Sub-Menu Click করে সদর দপ্তর হতে প্রেরিত দর/ অন্যান্য Data Software-টিতে Update করা যাবে । ।

Note : শুধুমাত্র **Admin** User-এর পক্ষেই দর Edit/Update সংক্রান্ত করা সম্ভব ।

▶▶ Scheme List ঃ

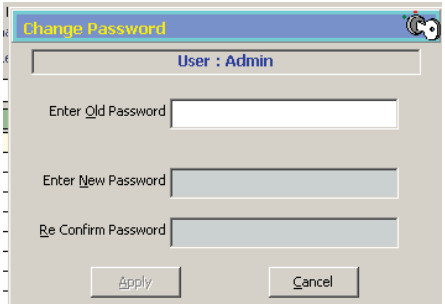
Scheme Menu থেকে **Scheme List** Sub-Menu Click করে Screen-টি পাওয়া যাবে।



এখানে Software টিতে সংরক্ষিত সকল স্কীমসমূহের Summary দেখা যাবে । Division, District, Upazila ইত্যাদি দ্বারা Filter করা ও সেই অনুযায়ী Report Print করা যাবে ।

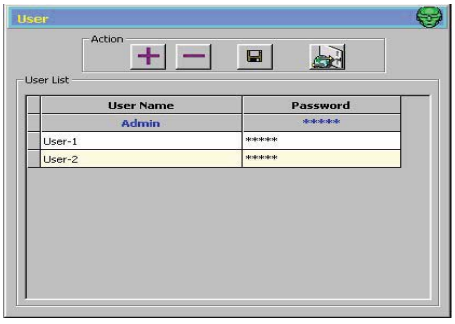
▶▶ Change Password ঃ

- **Security** Menu থেকে **Change Password** Sub-Menu Click করে Screen-টি পাওয়া যাবে।
- এখানে Old Password ও New Password প্রদান করে Log On-কৃত User এর নিজস্ব Password পরিবর্তন করা যাবে ।



▶▶ User ঃ

- **Security** Menu থেকে **User** Sub-Menu Click করে Screen-টি পাওয়া যাবে ।
- এখানে Software-টির জন্য ব্যবহারকারী Add/Edit ও ব্যবহারকারীদের Password পরিবর্তন করা যাবে ।



Note : শুধুমাত্র **Admin** User-এর পক্ষেই User Add/Edit সংক্রান্ত করা সম্ভব ।

Data Export/Import করার পদ্ধতি

Overview
- Scheme Export
- Scheme Import

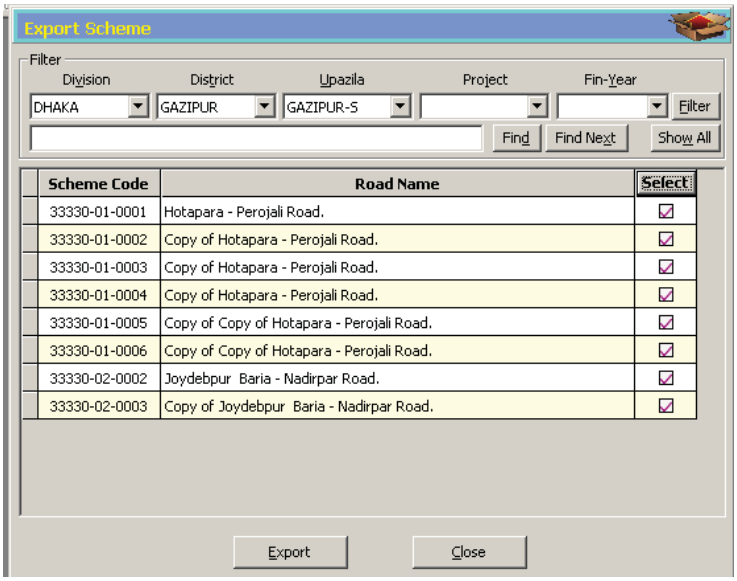
এই Module এ আমরা Scheme Export/Import পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Scheme Export করা যায় ।
- কিভাবে Scheme Import করা যায় ।

▶▶ Scheme Export ঃ

Scheme Menu থেকে **Export** Sub-Menu Click করলে নিম্নোক্ত Screen-টি পাওয়া যাবে।

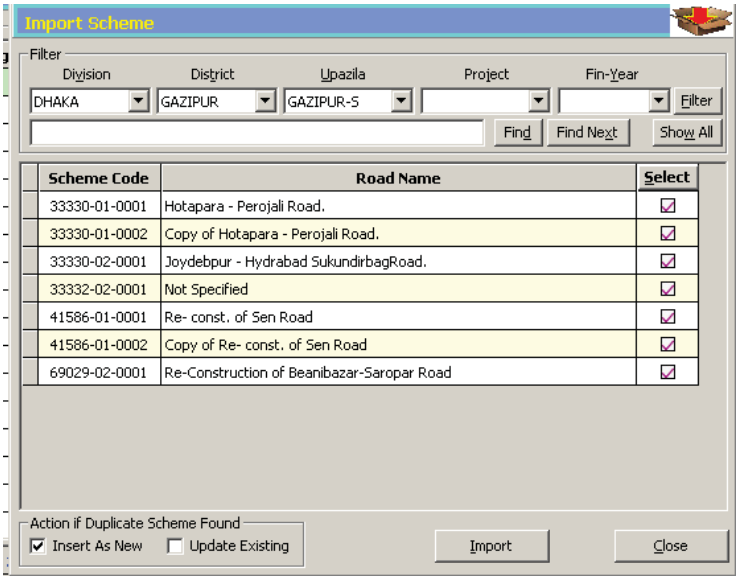


- যে সকল Scheme(s) Export করতে ইচ্ছুক সে সকল Scheme(s) এর বিপরীতে Select কলামে টিক দিতে হবে ।
- Select কলামের **Select** button-টি Click করে Toggle Select করা যায় ।
- Scheme Selection সম্পন্ন হলে **Export** button-টি Click করতে হবে ।
- এবার File Name এবং Location সম্বলিত ১টি Dialog Box দেখা যাবে । প্রয়োজনে এই File Name এবং Location পরিবর্তন করা যাবে ।
- এবার **Save** button-টি Click করলে Export সম্পন্ন হবে ।
- এখন Dialog Box-এ প্রদত্ত Location-এ Export-কৃত File-টি পাওয়া যাবে ।

Note :
- Division, District, Upazila ইত্যাদি দ্বারা Scheme List *Filter* করা সম্ভব।
- Scheme Code/Road Name-এর সম্পূর্ন/আংশিক অংশ Type করে *Find* button-এর মাধ্যমে কোন Scheme খুঁজে পাওয়া যেতে পারে ।
- একই Criteria মোতাবেক পরবর্তী Scheme খুঁজার জন্য *Find Next* buttonটি ব্যবহার করা যেতে পারে ।
- Software-টিতে সংরক্ষিত সকল Scheme দেখার জন্য *Show All* buttonটি ব্যবহার করা যেতে পারে ।

▶▶ Scheme Import ঃ

- **Scheme** Menu থেকে **Import** Sub-Menu Click করতে হবে ।
- এখন ১টি Dialog Box দেখা যাবে যেখান থেকে Import এর জন্য নির্ধারিত File-টি Select করতে হবে ।
- অতঃপর **Open** button-টি Click করলে নিম্নোক্ত Screen-টি পাওয়া যাবে।



- File-টি প্রাপ্ত সকল Scheme(s) এর বিপরীতে Select কলামে টিক দেওয়া থাকবে ।
- প্রাপ্ত List থেকে কোন Scheme(s) Import করতে না চাইলে সে সকল Scheme(s) এর বিপরীতে Select কলামে টিক উঠিয়ে দিতে হবে ।
- Select কলামের **Select** button-টি Click করে Toggle Select করা যায় ।
- এবার **Import** button-টি Click করলে Import সম্পন্ন হবে ।

Note :
- Division, District, Upazila ইত্যাদি দ্বারা Scheme List *Filter* করা সম্ভব।
- Scheme Code/Road Name-এর সম্পূর্ন/আংশিক অংশ Type করে *Find* button-এর মাধ্যমে কোন Scheme খুঁজে পাওয়া যেতে পারে ।
- একই Criteria মোতাবেক পরবর্তী Scheme খুঁজার জন্য *Find Next* buttonটি ব্যবহার করা যেতে পারে ।
- Software-টিতে সংরক্ষিত সকল Scheme দেখার জন্য *Show All* buttonটি ব্যবহার করা যেতে পারে ।

EVCS Software-এর বিভিন্ন Report Print করার পদ্ধতি

Overview

- Cross Section
- Longitudinal Profile
- Summary Sheet
- Wheat/Taka Sheet
- Level Book

এই Module এ আমরা EVCS Software-এর বিভিন্ন Report Print করার পদ্ধতি নিয়ে আলোচনা করবো ।

এই Module টি শেষ করলে আমরা জানতে পারবো ঃ

- কিভাবে Cross Section এ Longitudinal Profile এর Graph দেখা ও Print যায় ।
- কিভাবে Pre-Work Vs Design/ Pre-Work Vs Post-Work এর Summary Sheet দেখা ও Print যায় ।
- কিভাবে Pre-Work Vs Design/ Pre-Work Vs Post-Work এর Wheat/Taka Sheet দেখা ও Print যায় ।
- কিভাবে Pre-Work/ Post-Work এর Level Book দেখা ও Print যায় ।
- কিভাবে Input-কৃত Ditch সমূহের Detail Measurement দেখা ও Print যায় ।
- Graph সংক্রান্ত Tool-Bar এর পূনরাবৃত্তি ।

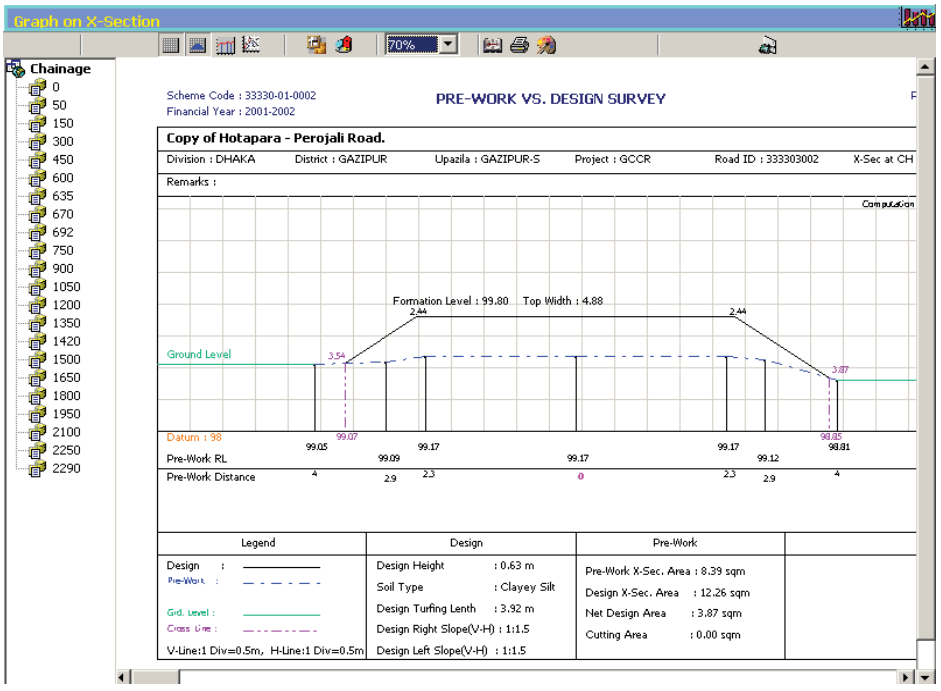
- **Tool Bar (Graph):**

Graph সমূহ Screen-এ প্রদর্শনের সময় নিম্নোক্ত Tool Bar-টি পাওয়া যায় যার Button সমূহের কার্যকারিতা বর্ণনা করা হলো ।

1. প্রদর্শিত Graph-টির Grid line show/hide করার জন্য
2. প্রদর্শিত Graph-টির Design portion show/hide করার জন্য
3. প্রদর্শিত Graph-টির Pre-work portion show/hide করার জন্য
4. প্রদর্শিত Graph-টির Post-work portion show/hide করার জন্য
5. Graph এর Option Set করার জন্য
6. প্রদর্শিত Graph-টি Fill করা/Fill উঠানোর জন্য
7. প্রদর্শিত Graph-টি Zoom করার জন্য
8. প্রদর্শিত Graph-টির Page Setup করার জন্য
9. প্রদর্শিত Graph-টি Print করার জন্য
10. প্রদর্শিত Graph-টি 'bitmap' আকারে Save করার জন্য
11. প্রদর্শিত Graph-টি Close করার জন্য

- **Cross Section:**

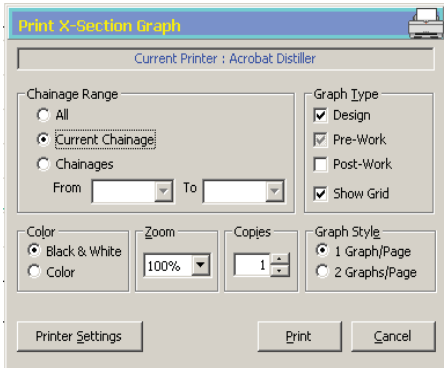
Cross-Section Graph দেখা/Print করার জন্য **Report** Menu থেকে **Cross Section** Sub-Menu Click করতে হবে ।



Screen-টির বাম দিকে অবস্থিত List থেকে Chainage Click করে সংশ্লিষ্ট Chainage-এর X-Section দেখা যাবে ।

▸▸ Cross Section Print করার পদ্ধতি ঃ

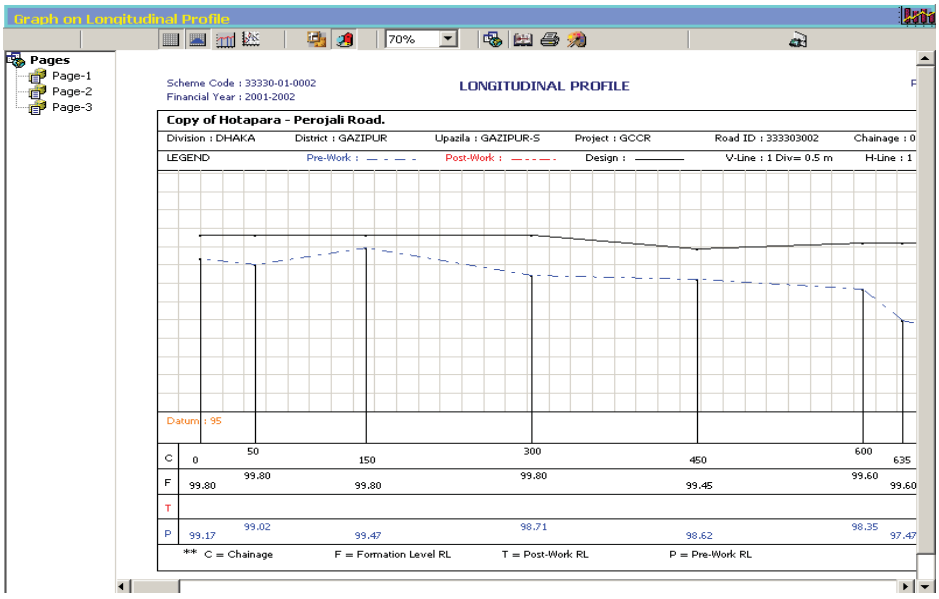
Cross-Section Print করার জন্য **Tool-Bar** থেকে **Print** button-টি Click করতে হবে । অতঃপর নিম্নোক্ত টি Print Dialog Box-টি দেখা যাবে ।



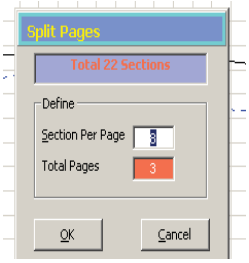
- Chainage Range Select করতে হবে ।
- Graph Type থেকে বিভিন্ন Graph Option Select করা যাবে ।
- প্রতি পাতায় ২টি করে Graph Print করতে চাইলে Graph Style থেকে *2 Graphs/Page* Option-টি Select করতে হবে ।
- প্রয়োজনে Printer Set করে নেয়া যাবে ।
- অবশেষে **Print** button-টি Click করতে হবে ।

▸▸ Longitudinal Profile:

Longitudinal Profile দেখা/Print করার জন্য **Report** Menu থেকে **Longitudinal Profile** Sub-Menu Click করতে হবে ।



- এখানে Default-ভাবে ৮টি Section নিয়ে একেকটি Page তৈরি হয় । তবে প্রয়োজনে তা নিজের ইচ্ছামাফিক করা সম্ভব ।
- এজন্য Tool-Bar থেকে button-টি Click করতে হবে । অতঃপর *Section Per Page*-এর ঘরে ইচ্ছামাফিক সংখ্যা বসিয়ে **OK** button-টি Click করলে সেই অনুযায়ী Page তৈরি হবে ।
- Longitudinal Profile Print করার জন্য Cross-Section এর Print পদ্ধতি অনুসরন করতে হবে ।



- **Summary Sheet:**

  Scheme-টির জন্য Section-Section অনুযায়ী মাটির Volume-এর Summary দেখা/Print করার জন্য **Report** Menu থেকে **Summary Sheet** Sub-Menu Select করে Pre Vs Design অথবা Pre Vs Post Work এর যে কোন ১টি Click করে সংশ্লিষ্ট Report-টি দেখা ও Print করা যাবে ।

- **Wheat Sheet:**

  Scheme-টির জন্য প্রয়োজনীয় গমের পরিমান দেখা/Print করার জন্য **Report** Menu থেকে **Wheat Sheet** Sub-Menu Select করে Pre Vs Design অথবা Pre Vs Post Work এর যে কোন ১টি Click করে সংশ্লিষ্ট Report-টি দেখা ও Print করা যাবে ।

- **Taka Sheet:**

  Scheme-টির জন্য প্রয়োজনীয় টাকার পরিমান দেখা/Print করার জন্য **Report** Menu থেকে **Taka Sheet** Sub-Menu Select করে Pre Vs Design অথবা Pre Vs Post Work এর যে কোন ১টি Click করে সংশ্লিষ্ট Report-টি দেখা ও Print করা যাবে ।

- **Level Book:**

  Level Book দেখা/Print করার জন্য **Report** Menu থেকে **Level Book** Sub-Menu Select করে Pre Work অথবা Post Work এর যে কোন ১টি Click করে সংশ্লিষ্ট Report-টি দেখা ও Print করা যাবে ।

- **Ditch Details:**

  Input-কৃত Ditch সমূহের Detail Measurement দেখা/Print করার জন্য **Report** Menu থেকে **Ditch Details** Sub-Menu Click করতে হবে ।

Terms Used in EVCS:

BR	:	Back Reading
FR	:	Fore Reading
HOI	:	Height Of Instrument
CL	:	Central Line
SR	:	Staff Reading
L1...L7	:	Left-1 ... Left-7 from Central Line
R1...R7	:	Right-1 ... Right-7 from Central Line
Inter SR	:	Intermediate Staff Reading
RL	:	Reduce Level
HFL	:	Highest Flood Level
NER	:	No Earthwork Required

Trouble Shooting:

সমস্যা ঃ Summary Sheet, Wheat/Taka Sheet, Level Book ইত্যাদি Report Print করতে গেলে *System or object defined error* জাতীয় Message দেখা যায়, Report-টি দেখা যায় না ।

কারন ঃ Operating System (বিশেষতঃ Windows 98) এ সমস্যা থাকার দরূন EVCS Software-টি সঠিকভাবে Install হয় না

সমাধান ঃ Crystal Report নামক Software-টি সংগ্রহ করে Install করতে হবে ।

অথবা

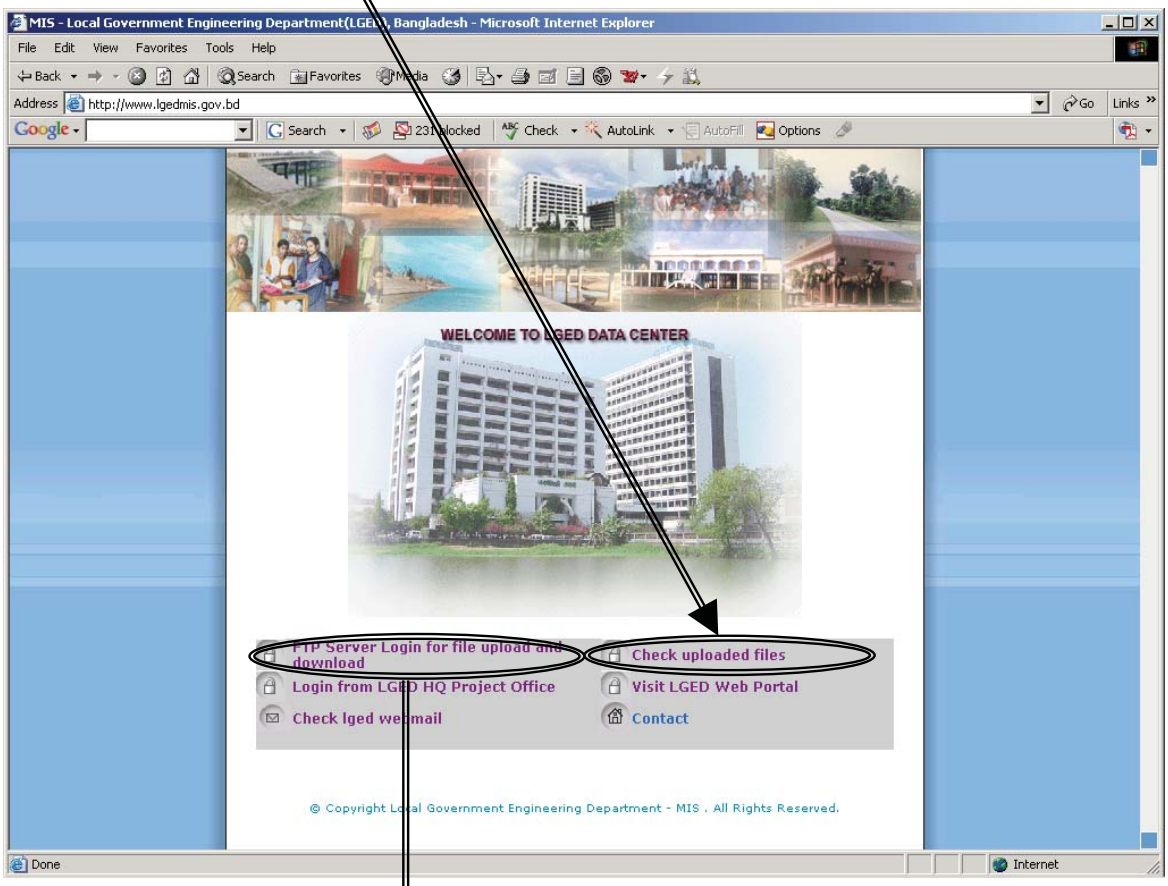
নতুন করে Operating System Install করে পূনরায় EVCS Install করতে হবে ।

Data Transfer System (FTP)

LGED FTP সাভার -এ Log in করার প্রনালী

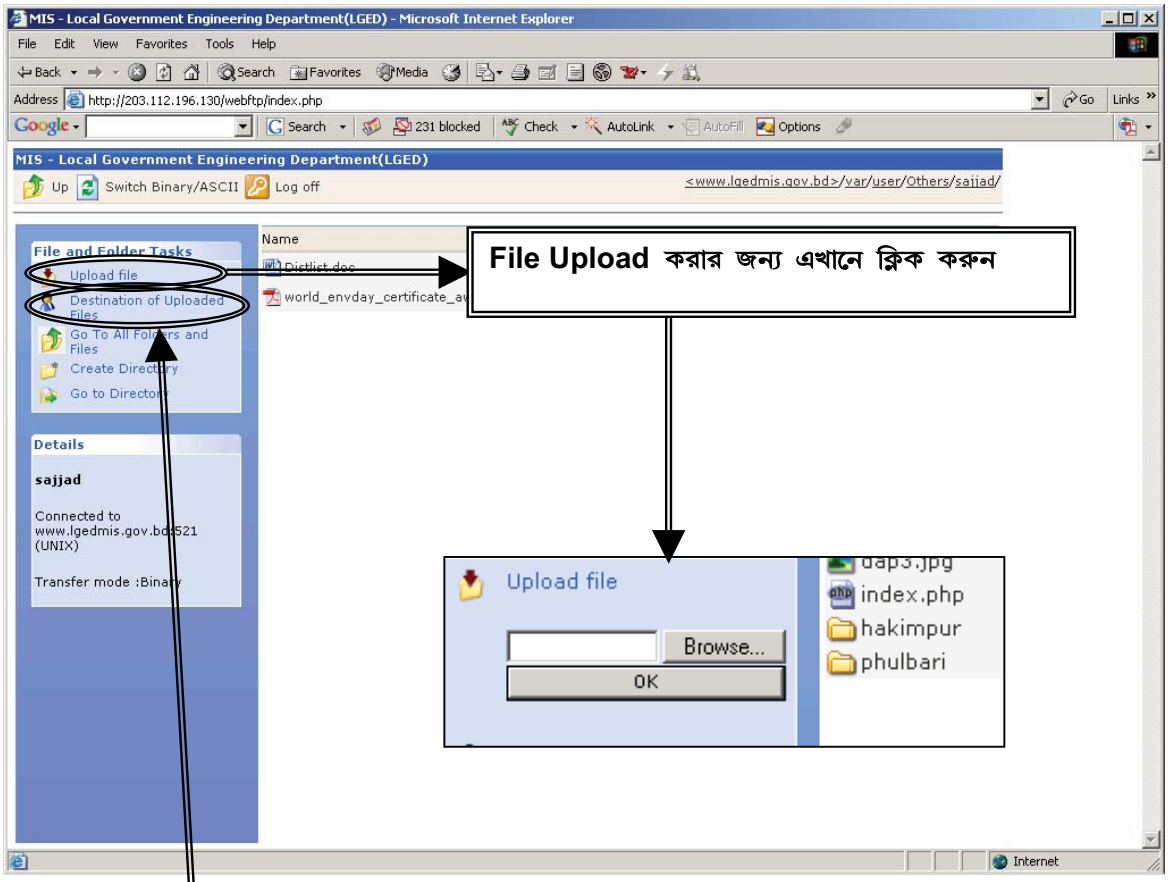
১. প্রথমে Widows এর Start Menu থেকে Internet Explorer ওপেন করুন । এবার এ্যাড্রেস বার -এ http://www.lgedmis.gov.bd টাইপ করুন । আপনি নিম্নলিখিত page টি দেখতে পাবেন । প্রথমে চিহ্নিত Check uploaded files (who uploaded for whom) Link - এ ক্লিক করে জেনে নিন আপনার জন্য কোন File Upload করা হয়েছে কি না ।

2. page টি open হওয়ার পর File Upload করার জন্য (FTP এর মাধ্যমে) নিম্ন লিখিত বৃত্তাকার চিহ্নিত Link – এ ক্লিক করুন (FTP Server Login for file upload and download (From LGED SE/XEN/Upazila Office)



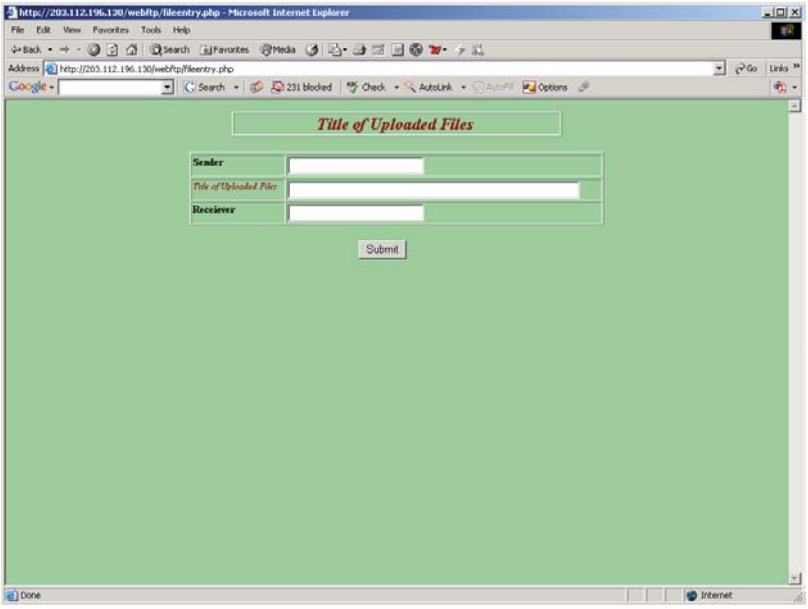
এখানে ক্লিক করুন (FTP এর মাধ্যমে File Upload করার জন্য)

২. এবার **File Upload (Folder –**এ ফাইল উঠানোর জন্য) করার জন্য নিম্নলিখিত **Log in** পেজ - এ সরবরাহ কৃত **User Name** (উদা ঃ ছোট অক্ষরে জেলা/অÂল -এর নাম) : এবং **Password : …….** টাইপ করুন

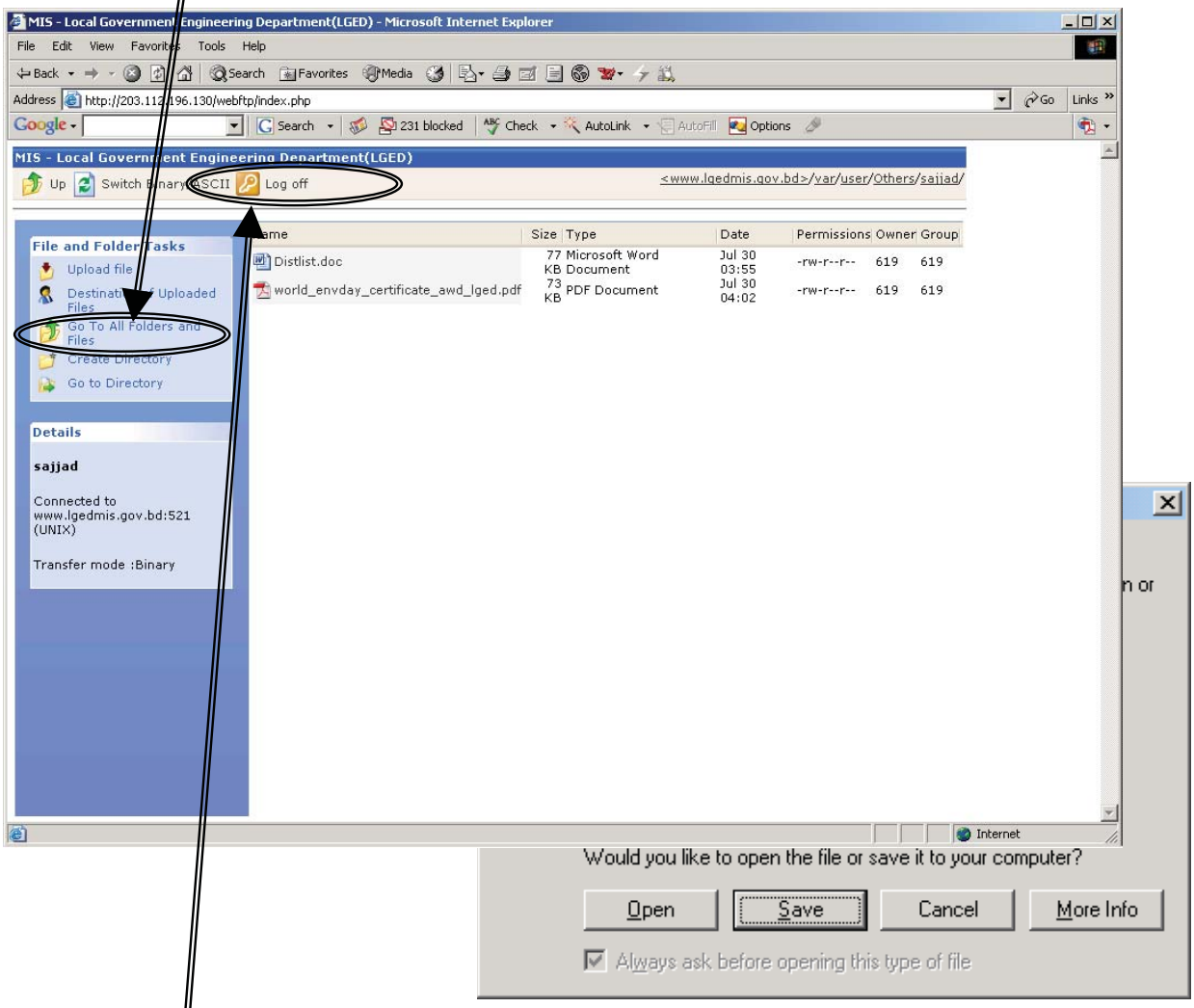


এরপর **Browse** বাটনে ক্লিক করে আপনার কম্পিউটার থেকে নির্ধারিত ফাইল টি সিলেক্ট করে **OK** বাটনে ক্লিক করে করুন । ফাইটি আপনার (জেলা) ফোল্ডারে **Upload** হবে ।

৩. **File** টি কার জন্য **Upload** করলেন তা জানানোর জন্য উপরে চিহ্নিত **(Destination of Uploaded file) Link** এ ক্লিক করুন । নিম্নলিখিত **page** টি **open** হওয়ার পর আপনার জেলা/অঐল/**Office** -এর নাম , কি ধরনের **File Upload** করলেন এবং কার জন্য(জেলার নাম, অঐলের নাম, সদর দপ্তরের কোন প্রকল্পের নাম) তার বিবরন টাইপ করুন ।



৪. এরপর **Go to all folders and files** লিংক -এ ক্লিক করলে আপনি সমস্ত **folder** -দেখতে পাবেন। আপনার প্রয়োজনীয় **folder**(জেলার নাম, অÂলের নাম, সদর দপ্তরের কোন প্রকল্পের নাম) - এ ক্লিক করে **open** করুন ।



folder ওপেন করার পর **file** এর উপর ডবল ক্লিক করে **Save** বাটনে ক্লিক করে আপনার কম্পিউটারে সেভ করুন

কাজ শেষে **Logo of** এ ক্লিক করুন ।

- **File** -এর নাম প্রদানের সময় **Apostrophe** এবং গ্যাপ (যেমন **Cox's Bazar Progress Report.doc** এর পরিবর্তে **Coxs_Bazar_Progress_Report .doc** হবে) পরিহার করুন।
- অনেকগুলি **File** ও **Sub-Folder** সমন্বয়ে গঠিত কোন **Folder** (যেমন **GIS** -এর কোন **Thana Folder**)পাঠাতে চাইলে প্রথমে **WinZip** দ্বারা **Folder** টি **Zip** করে নিয়ে **Upload** করুন । এতে সুবিধা হলো, **Folder** টি সাইজে অনেক ছোট এবং একটি **File(Zip)** হিসেবে **Upload** করা যাবে । প্রতিটি **File** ও **Sub-Folder** আলাদা ভাবে বেশী সময় নিয়ে পাঠানোর প্রয়োজন হবে না।
- বর্তমান **Data Transfer speed** -এর ভিত্তি করে **FTP** সার্ভিসের মাধ্যমে সর্বোচ্চ ২০ মেগা বাইট পর্যন্ত সাইজের ফাইল আদান প্রদানের করা ব্যবস্থা আছে।