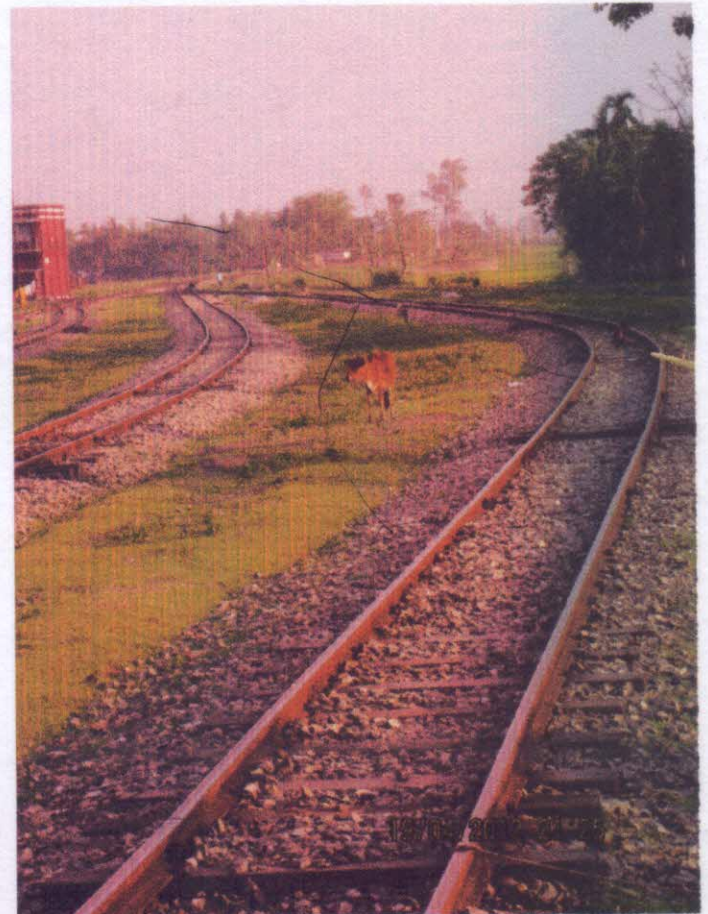




A-3637(1)

Government of the People's Republic of Bangladesh  
IMED, Ministry of Planning  
Sher-e-Bangla Nagar  
Dhaka-1207

**IMPACT EVALUATION STUDY OF REHABILITATION OF  
MAIN LINE SECTIONS OF BANGLADESH RAILWAY PROJECT  
(WEST ZONE) (2<sup>nd</sup> REVISED)**



JUNE 2012



**IMPACT EVALUATION STUDY ON REHABILITATION OF MAIN LINE  
SECTIONS OF BANGLADESH RAILWAY (WEST ZONE) (2<sup>ND</sup> REVISED)**

**TCIL Professionals.**

1. **Dr. Khandaker Mustahidur Rahman**  
Team Leader,  
Former Vice Chancellor  
Jahangirnagar University
2. **Engr. M. Abdur Rahim**  
Consultant  
Former Director General  
Bangladesh Railway
3. **Dr. M M Amir Hossain**  
Consultant
4. **Prof. Dr. Md. Razzab Ali**  
Consultant
5. **Enamul Ibne Kader**  
Project Coordinator
6. **Md. Rashedul Hasan (Rony)**  
Project Officer

**IMED Officials**

1. **Syed Md. Haider Ali**  
Director General
2. **Md. Khalilur Rahman**  
Director
3. **Md. Mosharaf Hossain**  
Assistant Director
4. **Md. Masud Rana Parvej**  
Evaluation Officer

***Carried out by:***

**Evaluation Sector  
Implementation Monitoring and Evaluation Division (IMED)  
Ministry of Planning  
Government of the People's Republic of Bangladesh**

***Conducted by***

**Technoconsult International Limited (TCIL)**

The N Building, Building # 01, Road # 16, Sector # 06,  
Uttara Model Town, Dhaka -1230, Bangladesh

**June - 2012**



## EXECUTIVE SUMMARY

### Project Background

The assignment is intended to conduct an Impact Evaluation Study for Rehabilitation of Main Line Sections of Bangladesh Railway (West Zone) - 2<sup>nd</sup> revised covering the implementation period from July 1996 to June 2009 under Asian Development Bank (ADB) assistance and executed by the Bangladesh Railway (BR) under Ministry of Communications aiming to assess the implementation status of the project components, assess the outcome of the project in terms of safety and timely running of the passengers as well as to identify major strengths and weaknesses of the project and to suggest appropriate measures to overcome those. BR has always played a vital role in economic growth and development of Bangladesh by hauling both goods and passengers. However, BR has been facing formidable challenges from alternative modes of transport during the past decades. Considering the importance of this sector and to cope up with the road network development, the Government of Bangladesh has planned to rehabilitate the Main Line Sections of BR (West Zone) for safety and timely running of the trains with higher speed. As a result, the project was under taken to rehabilitate 524.18 km (Khulna-Ishurdi including Ishurdi-Azimnagar (ISD-AZGR) & Ishurdi-Ishurdi by pass 293.00 km, Rajshahi -Abdulpur 41.00 km, Poradaha-Goalanda 76.43 km, Parbatipur-Saidpur 15.50 km, Santahar-Bonarpara 82.50 km & Kaunia-Lalmonirhat 15.75 km) Main line sections of Bangladesh Railway (West Zone) -2<sup>nd</sup> revised with a cost of 53738.52 lakh Taka.

### The objectives of the project

- To ensure safety of passengers and timely running of trains with higher speed, rehabilitation of 524.18 km (Khulna-Ishurdi including ISD-AZGR & Ishurdi-Ishurdi by pass 293.00 km, Rajshahi - Abdulpur 41.00 km, Poradaha-Goalanda 76.43 km, Parbatipur-Saidpur 15.50 km, Santahar-Bonarpara 82.50 km & Kaunia-Lalmonirhat 15.75 km) Main line sections of West Zone of Bangladesh Railway.
- On completion of the project it is expected that train will operate over these sections with higher speed ensuring safety to the travelling passengers.

### The objectives of the evaluation study of the project

The objectives of the assignment are to

- Assess the implementation status of the project components,
- Assess the outcome of the project in terms of safety and timely running of the passengers,
- Identify major strengths and weaknesses of the project and suggest appropriate measures to overcome those.

**Target groups:** The evaluation study was conducted by the physical visit, individual survey, Focus Group Discussion (FGD) and Key Informant Interview (KII) in the six main line sections of BR (West Zone) for both quantitative and qualitative findings of the project areas. The physical visit was conducted by the expert team of the evaluation study on 20.00% length (104.83 km) of the total length (524.18 km) of the six main line sections to identify the implementation status of the rehabilitation works. For quantitative information, the individual survey was conducted through a pre-tested questionnaire upon randomly selected 1500 project beneficiaries comprised of 1200 program (project intervention areas) group and 300 control (other than project intervention but adjacent to project sections) group respondents such as passenger, importer/exporter, industrialist, business person and others who were using train services encompassing issues about the impact and benefits of the train lines such as safety and timely running of trains, and also about the quality, durability, sustainability aspects of the train lines. For qualitative information, the FGDs were conducted using pre-tested questionnaires upon 6 homogenous group in six sections, where one group for each section consist of 20 respondents comprising locomotive drivers, signal operators, train operators, way men, Feeder and Switch Board Assistant and other officials of BR to identify the impact of the project activities.



The KII was conducted upon 10 senior level BR officials and 12 Project Management Personnel of BR with a semi-designed questionnaire to obtain information about the quality, durability, sustainability, cost-effectiveness of the rehabilitation works as well as to obtain information about the design, longevity, management, maintenance, strengths and weaknesses of the project and future planning for the improvement of Bangladesh Railway.

#### **Implementation Status of Rehabilitation works of the Main Line sections**

The status of Rehabilitation works of Main Line Sections studied by the physical visit under the project areas conducted by the experts of the evaluation team is presented below:

##### **Khulna-Ishurdi & Ishurdi-Ishurdi bypass section**

- The railway tracks laid with 90 lb A rails from Ishurdi bypass to Ishurdi and Ishursi to Darshana are provided with double line facility, but from Darshana to Khulna the track is single line. Both wooden sleepers and steel sleepers on this section were found in good condition with all fittings and materials as well as points and crossings, but about 10-15% wooden sleepers were found longitudinally cracked in Ishurdi Junction area toward Ishurdi bypass. The Project Management Personnel of BR reported that the rehabilitation works in this area had been completed in 1999, but the physical visit was made in April 2012. Meanwhile, about 12-13 years was elapsed.
- In the railway track of Noapara-Bejerdanga-Fultola-Daulatpur-Khulna portion on the way of Jessore-Khulna, a large number of wooden sleepers (40-50%) were found unserviceable and severely damaged condition. Insufficient quantity of ballasts with less ballast cushion was also found in the track between Khulna to Daulatpur station (from km 3/1 to km 8/2).
- The rehabilitation works from Noapara to Khulna had not been completed within the stipulated time frame due to insufficient allocation of required fund as well as delayed procurement process as reported by the Project Management Personnel of BR, Pakshey. As a result, the balance work project of 29 km track from Noapara to Khulna through sleeper renewal (TSR) and 128 km track of deep screening from Ishurdi to Khulna is undergoing.

##### **Rajshahi to Abdulpur section**

- The railway track laid with 90 lb A rails (broad gauge) from Rajshahi to Abdulpur was installed with steel sleepers. The condition of rails, steel sleepers with all fittings and ballast were found in good condition except in Rajshahi Railway station area.
- Within half a km from Rajshahi Railway Station toward Abdulpur, about 20-25% wooden sleepers were found in damaged conditions with cracks and rotting and in some cases wooden sleepers lost their gripping capacity with dog spikes, where some dog spikes and rail plates were also rusted, and tracks were filled with insufficient amount of ballasts and mixed with soil. But the Project Management Personnel of BR at Pakshey reported that the Rajshahi station area of this section was beyond the project.

##### **Poradaha to Goalanda section**

- The railway tracks laid with 90 lb A rails (broad gauge) from Poradaha to Goalanda, but the rehabilitation works had not been completed within the stipulated time frame due to insufficient allocation of required fund as well as delayed procurement process. As a result, the 41 km of complete track renewal works of Kustia-Charaikol-Surjanagar portion of this section as well as 21 km track of deep screening from Kustia to Charaikol, Kalukhali to Pangsha, and Belgachhi to Panchuria are undergoing through balance work project as reported by the Project Management Personnel of BR at Pakshey.



- The replacement of the unserviceable wooden sleepers of bridge no. 44/R, 50/R, 56/R, 65/R and 67/R of the Poradhaha-Goalanda section is also undergoing through balance work project.

#### **Parbatipur to Saidpur section**

- The railway tracks laid with 90 lb A rails (broad gauge) from Parbatipur to Saidpur installed with wooden sleepers, where the railway tracks of Parbatipur railway station toward Saidpur, about 20-25% wooden sleepers were found in unserviceable condition showing cracks and rotting, among which about 10-15% sleepers were found severely damaged.
- Within 1.0 km ahead from Parbatipur railway station toward Saidpur, the points and crossing no. 22 A was found in broken condition.
- Similarly, within 1-2 km away from Saidpur railway station toward Parbatipur, about 20-30% wooden sleepers were found in bad condition showing longitudinal cracks, among which about 10-15% sleepers were found unserviceable and severely damaged condition showing cracks and rotten; where in some cases the ballasts were mixed with soil on which grasses are grown up.
- The Project Management Personnel of BR, Pakshey reported that the rehabilitation works in the Parbatipur-Saidpur section had been completed with the re-installation of released wooden sleepers in 2001-2002. Contrary, the physical visit was made in April 2012. Meanwhile, about 10-11 years was elapsed.

#### **Santahar to Bonarpara section**

- The railway tracks laid with 75 lb A rails from Santahar to Bonarpara, where the rails and sleepers were found in good condition with related fittings and materials; the ballasts with sufficient ballast cushion beneath the sleepers were also found, but found with less ballast shoulder.

#### **Kaunia to Lalmonirhat section**

- The railway tracks laid with 75 lb A rails (meter gauge) from Kaunia to Lalmonirhat, where the rails and sleepers were found in good condition with related fittings and the sufficient quantity of ballasts with sufficient ballast cushion were also found all over the main line sections.
- The railway tracks installed with wooden sleepers in both Kaunia station area and Lalmonirha station area, where the tracks were filled with sufficient quantity of ballasts but these ballasts were mixed with soil.

#### **Impact of the rehabilitation works on the target groups**

The findings of the impact of the project activities on the major expected output in the project areas were given below:

- **Impact of the project activities on speed improvement:** The speed of train for all main line sections increased significantly after the rehabilitation works except Poradhaha-Goalanda section. The extent of speed improvement ranged from 24.00 to 106.23 percent. Considering the section wise speed improvement, the highest speed improvement (106.23%) was found in Santahar-Bonarpara section and the very good condition of the track with rails, sleepers and related fittings as well as sufficient amount of ballast as found during physical visit might be the reason for highest speed improvement. On the other hand, the lowest speed improvement (24.00%) was found in Parbatipur-Saidpur section. Similarly, on an average 39.03%, 36.67%, 51.20% speed improvements were found in Khulna-Ishurdi & Ishurdi-Ishurdi bypass section, Rajshahi-Abdulpur section and Kaunia-



Lalmonirhat section, respectively. On the other hand, the extent of speed reduction was found in Poradaha-Goalanda section instead of improvement. Because the rehabilitation works have not been completed in Poradaha-Goalanda section within the stipulated time frame and the balance work project is now in progress that restricts the smooth running of the trains with higher speed. This situation might be the reasons for speed reduction in this Poradaha-Goalanda section than earlier instead of increasing speed.

**Impact of the project activities on train accidents:** The train accident using the rail lines under the project area decreased significantly than before due to rehabilitation works and safety of the passengers has been improved significantly all over the rail lines in Bangladesh railway as recorded found in the "Information Book 2010, Bangladesh Railway". The information depicted that the number of train collisions (14) was the highest in 2001-02 and these collisions per year gradually declined and it was only 2 in 2009-10. Similarly, the number of derailment of trains in 2001-02 was 624 and it was the highest (790 per year) in 2005-06, then the derailment gradually declined and the lowest (403) was occurred in 2009-10. Considering the total train running into obstruction, the obstruction was also gradually declined from 67 in 2001-02 to 34 in 2009-10. These reduction trends are the overall scenario of accidents occurred in both East and West Zone of Bangladesh Railway. These gradual reduction trends of accidents occurred all over Bangladesh also reflects the reduction trends of accidents occurred in West Zone of Bangladesh Railway. But separate authentic information regarding train accidents, particularly for the Project area (BR, West Zone) is not found.

- **Utility of main line sections of railway:** All six main line sections of the railway of Bangladesh Railway (West Zone) are being used year round for travel.
- **Knowledge about rehabilitation works:** The project beneficiaries were aware about the rehabilitation works of the main line sections of Bangladesh Railway (West Zone) which included filling up of rail lines by ballast, installation of fishplates & joints; installation of new rails in the railway tracks.
- **Difficulties and risk faced before rehabilitation works:** Before rehabilitation works, the major difficulties faced by the beneficiaries were more travel time needed; possibility for accident and trains ran slowly; as well as they also faced high risk during travel and transportation of goods using the rail line.
- **Advantages created by means of rehabilitation works:** The major advantages created by the implementation of rehabilitation works had increased speed of the trains, comfortable travel, and increased safety of the passengers as well as increased the frequency of travel of passenger/goods.
- **Safe travel:** Most of the beneficiaries opined that the travel using the rail line had become safer after the implementation of rehabilitation works under the project areas.
- **Comfort of travel than before:** Most of the beneficiaries felt comfort of the travel using rail line than before due to rehabilitation works under all six railway sections of the project areas. Among the identified comfort of travel, jerking of the trains using the rail line decreased significantly than before.
- **Timely running of trains and reduction of travel time than before:** All the trains run timely with higher speed after the rehabilitation works than before. Most of the cases, the travel time declined about 21-30% using rail lines under the project than before.
- **Increment of passengers and transportation of goods:** The frequency of travel by the passengers and transportation of goods using the rail line increased significantly after the implementation of rehabilitation works under all the railway sections.



- **Incorporation of new trains and run over the rail line:** All kinds of new trains such as new passenger trains, new locomotive and wagons were incorporated on the railway tracks all over the main line sections of the project areas and all these trains run all over the rail lines after rehabilitation works.
- **Regular repair and maintenance of the rail line:** The regular repair and maintenance of the rail lines are being conducted all over the main line sections, but inadequately.
- **Present condition of railway sleeper, fishplate and ballast after rehabilitation works:** The present condition of railway sleepers, fishplate and railway ballast are found in good condition after rehabilitation works; but in some cases the present condition of sleepers were found in broken condition, and but railway ballast were found as before.
- **Quality and durability of the works:** The quality of the works was maintained and assured during the rehabilitation works. The durability of the rail line also increased due to rehabilitation works.
- **Improvement of the social and natural environment:** The social and natural environment also improved due to rehabilitation works of the rail line under the project areas.
- **Essential improvement needed for safety and timely running:** The essential improvement of the rail line needed for safety and timely running are the establishment of double line railway tracks, provision of sufficient number of trains and coach, improvement of the passengers' facilities and provision of sufficient number of locomotive and wagon.

#### **Strengths of the project**

- **Track renewal with new rails:** The replacement of the old and damaged rails by the re-installation of large quantity (30700 M. Ton of 90 lb A and 7820 M. Ton of 75 lb A) of new rails has increased the running capacity of trains and axle load of the tracks than before.
- **Track renewal with new sleepers and related fittings:** The replacement of old and damaged sleepers by the re-installation of large quantity of new wooden sleepers (244000 pcs for broad gauge & 25000 pcs for meter gauge), as well as new (266000 pcs) and re-conditioned (255000 pcs) steel sleepers; crossing sleepers (32145 cft), bridge timbers (43170 cft) for both broad gauge and meter gauge lines as well as new fishplates (24550 sets) and bolts (640000 pcs) has increased the strengths of the railway tracks providing running capacity of the trains and axle load of the tracks than before.
- **Track renewal with new ballast and deep screening:** The re-ballasting of railway tracks with large quantity (17075000 cft) of new ballast as well as deep screening of both broad gauge and meter gauge lines under rehabilitation works have increased the axle load capacity of the rails and reduced the jerking of the trains during running with higher speed on the tracks.
- **Track renewal with new points and crossing body and signalling materials:** Rehabilitation with re-installation of new points (134 sets) and crossing body and signalling materials have made the tracks for smooth and safe running of the trains than earlier.
- **Welding of rail joints:** Welding of large number (46370 joints) of rail joints throughout all the railway sections under the project has reduced the jerking of the trains during running on the tracks.

#### **Weaknesses of the project implementation process**

##### **Internal weakness**

- **Labour shortage:** Insufficient daily labour wage as per PP (56 Taka/head/day from 1995-June 1998 and 80 Taka/head/day from 1998-June 2009) has created problems in procuring labour from open market that made the shortage of labour supply and resulting in delay in implementation of the rehabilitation works.



- **Shortage/ delayed release of available budget:** The goods for rehabilitation works were not procured and supplied in time due to shortage and delayed release of fund allocated for the project, resulted in the delay of the project implementation. The Poradaha-Golanda section as well as Noapara-Khulna portion of Ishurdi-Khulna section could not be completed with the stipulated time as because of insufficient allocation of required fund as well as delayed procurement process.
- **Delayed delivery of the sleepers:** Wooden sleepers were procured by the project as per requirements and handed over to the Track Supply Officer (TSO)/East/Chittagong of BR for treatment of the sleepers. But delayed delivery of sleepers from TSO after treatment has delayed the implementation of the project works.
- **Insufficient management staff:** The management team of the rehabilitation works faced difficulties during implementation of the project, because the sufficient numbers of management staff were not recruited as per requirement of the project. Instead of it, the revenue staffs were engaged by deputation to complete the rehabilitation works, where sufficient number of revenue staff was not deputed.
- **Use of released sleepers:** Re-installation of railway tracks with released wooden sleepers was done for Parbatipur-Saidpur section as reported by the Project Management Personnel of BR. Thus the longevity of the rail lines has reduced.
- **Design of the works:** Improper packing of ballast beneath the railway tracks enhanced the quick and regular displacement of ballast and made the tracks weak during running of trains with higher speed.
- **Incompletion of the works:** Some works for Poradaha-Goalanda section as well as Khulna- Ishurdi section have not been completed due to insufficient allocation of required fund as well as delayed procurement process as reported by the Project Management Personnel- or BR, Pakshey. Therefore, the balance work project is undergoing among these sections particularly by means of complete track renewal works of 41 km track from Kustia-Charaikol-Surjanagar as well as deep screening of 21 km track from Kustia to Charaikol, Kalukhali to Panksha, and Belgacchi to Panchuria of Poradaha-Goalanda section. Similarly, under Khulna-Ishurdi section, balance work project of 29 km from Noapara to Khulna through sleeper renewal (TSR) and 128 km of deep screening from Ishurdi to Khulna is also undergoing as reported by BR officials.
- **Non-conformance by the contractor:** One case of non-conformance by the contractor was reported due to delay of supply of the ballasts for only one agreement. This non-compliance was mitigated by imposing 10% penalty of face value for specific agreement.

#### **External weakness**

- **Flood:** The devastating floods of 1998 and 2004 affected the rehabilitation works for smooth running resulting delay of the project implementation.
- **Lack of modernized signalling system:** The modern and computerized signalling systems have not been installed all over the main line sections. Thus the trains faced difficulties during crossing of the stations causing stay of one train on the track of one station until crossing of the respective station by another train and delayed the timely running of the trains.
- **Excess traffic load:** The excess traffic load caused severe pressure on the rails and sleepers over the railway tracks especially for single line railway and enhanced the displacement of ballasts from the tracks causing jerking of the trains when running with higher speed.



### **Sustainability of the project**

- **Quality of the works:** The contractor and or client had carried out the laboratory tests of ballasts, wooden and steel sleepers; Pandle clips/rail clips, dog & screw spikes and all P-way fittings in Bangladesh University of Engineering and Technology (BUET) according to the technical specifications and good performance was reported for laboratory tests.
- **Durability of the works:** According to feedback found from the concerned officials of the BR, about 50 years durability period for new steel sleepers; about 10-15 years for new wooden sleepers with related fittings; and about 10 years for deep screening of ballast have been reported.
- **Traffic density/excess axle load on the rail line:** Continuous increasing passengers' load and excess axle load create excess pressure on the rails and sleepers of the tracks, thus reduce the longevity of the rail lines.
- **Sustainability/longevity of the works**
  - **Design of the works**
    - Proper ballasting of the rail lines with sufficient quantity and packing of ballasts as well as sufficient ballast cushion increase the longevity of the railway tracks.
    - Proper packing of ballast should be done to retain the sufficient quantity of ballast with proper ballast cushion.
  - **Materials of the works:**
    - Higher axle load bearing rails increase the longevity of the rail lines.
    - Pre-stressed concrete sleepers should be installed instead of wooden and steel sleepers as the life span of concrete sleepers is much more (up to 50 years) than wooden and steel sleepers as well as there is less scope of theft.
  - **Management of the works:** All categories of supervisory staffs should be engaged for proper management of the rail lines to increase their longevity.
  - **Maintenance of the works:** Modern mechanized maintenance system of the rail lines should be introduced to increase the longevity of the rail lines. Until introduction, regular maintenance work should be carried out.
- **Cost-effectiveness of the works:** Due to the ease of movement of passengers and timely running of the trains, resulted in the enhancement of the economic activities of the people with export-import trades for national and international markets.

### **Recommendations**

- **Avoidance of delay in implementation:** The commencement period of the project was 1995-1996 and the original completion period was 1999-2000, but the project was actually completed in 2008-2009. As a result the project was delayed for 8 year. This delayed implementation increased (37.67%) the project cost from original cost 39033.00 lakh Taka to 2<sup>nd</sup> revised cost 53738.52 lakh Taka (). Therefore, delay in implementation of the project should be avoided and it should be implemented within the stipulated time and work frame.
- **Design of the works:** Proper packing of ballast with sufficient ballast cushion should be done for the prevention of quick and regular displacement of ballast from the railway tracks.
- **Traffic load distribution by the establishment of double line facilities:** To distribute traffic load, the double line railway facilities should be established by phases along with separate set up of manpower all over the rail line sections instead of single line railway.
- **Installation of higher axle load bearing rails:** Higher axle load bearing rails should be installed by phases all over the main line sections of railway tracks instead 75 lb A rails and more. However, further detail study may be conducted in this regard to take final decision.
- **Installation of computerized signalling system:** The computerized signalling system including relay colour light-inter locking system and auto switch cabinet for point crossing signal should be installed all over the railway tracks instead of existing colour light signalling system.



- **Installation of concrete sleepers:** Pre-stressed concrete sleepers should be installed all over the main line sections of railway tracks instead of wooden and steel sleepers by phases as the life span of concrete sleepers is much higher (> 50 years) having less scope of theft than wooden and steel sleepers.
- **Periodic deep screening and ballasting:** After the durability period (10 years), deep screening and repacking of ballasts should be done to maintain the strengths of the railway tracks for fast running of the trains with higher speed.
- **Procurement of sufficient number of trains/coach/locomotive/wagon:** Sufficient number of new trains and coaches with modern facilities, locomotive and wagons should be procured and provided to maintain the travel time schedule with smooth running of the trains with higher speed as well as to fulfil the ever increasing demand of the passengers to increase the frequency of availability of the trains.
- **Introduction of mechanized maintenance system:** Modern mechanized maintenance system of the rail lines should be introduced.
- **Regular repair and maintenance:** Until the introduction of modern mechanized system, the regular repair and maintenance works of the railway tracks including rails, rail joints, sleepers, fishplates, points and crossing, ballast cushion, signalling system should be done and continued to prevent any severe damage.
- **Provision of sufficient management staff:** Sufficient number of all categories of management staff including station masters to maintain working schedule for all stations should be recruited and provided immediately to ensure proper and timely running of trains as well as management of the repair and maintenance works.
- **Provision of sufficient fund:** Sufficient amount of funds should be provided for emergency and regular repair and maintenance of the works of the railway tracks all over the sections of the project.
- **Self reliance to the Bangladesh railway:** Sufficient number of passenger trains with modern facilities, modern locomotives as well as wagons should be procured and provided to fulfil the ever increasing demand. Simultaneously, the reasonable train fare should be fixed as well as ticket fare should be collected with transparent way without any unfair means to earn revenue for self reliance of the railway at least to save from any loss of Bangladesh Railway. The travel ticket of the passengers should also be monitored strictly during travel.