

Chapter 4: Modernisation of Signaling and Telecommunication System by Indian Railway Project Management Unit

4.1 Introduction

Ghaziabad (GZB) – Kanpur (CNB) rail route of North Central Railway (NCR) is one of the heavily congested routes of Indian Railways (IR). In August 1995, one of the worst rail accidents in the history of the IR occurred at Firozabad on Tundla - Shikohabad section, when 310 lives were lost. This accident was a rear collision of two Express trains¹⁰⁶ on account of wrong manual operation of Signaling and Telecommunication (S&T) system¹⁰⁷. After this accident, with a view to increase reliability of S&T system in providing safe running of trains and also to increase the line capacity of available tracks, Railway Board decided (1995) to modernise S&T system on GZB- CNB route. The existing S&T assets on the route were very old (ranging from 35 to 60 years) and were due for replacement on priority basis. S&T system modernisation was to reduce probability of accidents through reduction in the scope of human error and to achieve efficiency and safety in train operations through centralised traffic control.

In view of the urgency involved in modernisation of S&T system on the route, Ministry of Railways (MoR) approached (1995) Ministry of Finance (MoF) to arrange a loan from a German Government owned Development Bank¹⁰⁸. MoF entered into (August 1997) a ‘Loan Agreement’ with the KfW for DM 185,000,000¹⁰⁹ with direct disbursement method¹¹⁰. The loan amount was to be disbursed by KfW upto 31 December 2001 as per which they had the right to refuse to disburse¹¹¹. Later, MoR (the executing Authority) also entered into (December 2000) a ‘Separate Agreement’ with KfW defining the terms and conditions for the execution of works.

Ministry of Railways decided (February 2002) to execute 11 major works as mentioned in *Appendix I* for S&T modernisation of route by utilising KfW loan. These 11 works included seven works [(a) to (g)] which had already been sanctioned by MoR at a total cost Rs 140.50 crore during 1995-96 to 2001-02

¹⁰⁶ Kalindi Express and Purushottam Express.

¹⁰⁷ Signalman cleared Purushottam Express to run on a track on which Kalindi Express had stopped outside Firozabad Railway station a cow getting hit by the engine.

¹⁰⁸ Kreditanstalt Fur Wiederaufbau (KfW) at Frankfurt.

¹⁰⁹ On an interest at the rate of 0.75 per cent per annum and commitment charges at the rate of 0.25 per cent per annum on undrawn balance of loan amount out of that got withheld by KfW for disbursement during the year.

¹¹⁰ The invoices for work done were to be raised by the contractor, measured by the Railway, checked and signed by the consultant and then forwarded through MoR and MoF to KfW for direct payment to the contractor. The release of fund was linked with the progress of work.

¹¹¹ in terms of Para 2.2 of ‘Loan Agreements’

and were ongoing. Expenditure to the extent of ₹30.56 crore had been incurred (March 2003) on these seven works¹¹² through General Budgetary Support (GBS)¹¹³. The remaining four works [(h) to (k)] were newly sanctioned works included in Works Programme 2002-03.

Ministry of Railways engaged¹¹⁴ (December 2002) a Consultancy Company¹¹⁵ (contract value- Euro 3.91 million) for technical advice to Project Authorities and supervision of 11 works for S&T modernisation of the route. Further, MoR was also required¹¹⁶ to form a dedicated Project Management Unit for centralized execution of KfW funded works. MoR accordingly set up (May 2003) Indian Railway Project Management Unit (IRPMU) in New Delhi.

For the execution of 11 major works funded by KfW, a contract was awarded (September 2005) by GM, NCR (contract value in Indian currency - ₹440.45 crore)¹¹⁷ to M/s Ansaldo Signal Consortium (M/s ASC). The scope of contract work included various type of works¹¹⁸. The original scheduled date of completion of this major contract was fixed as July 2009. However, the Project work progressed very slowly and could be completed to the extent of 35 per cent only by July 2009. Thereafter, extensions were granted on five occasions upto December 2014. Till then, the physical progress of the Project work was 69 per cent only and out of 11 works included in the scope of work awarded through this contract, only two works¹¹⁹ were completed. KfW continued disbursement of loan till December 2014 on requests from MoR.

However, considering the problems in Project execution, KfW terminated 'Loan'¹²⁰ in February 2015 on account of slow progress. MoR, therefore, decided to get the remaining works completed by December 2015 through M/s ASC utilising Gross Budgetary Support (GBS).

¹¹² by the end of March 2003

¹¹³ For the creation of Railway assets, MoR takes support from MoF in the shape of loan for which provision is made in General Budget every year. Dividend at certain prescribed rate is payable by MoR on such loan.

¹¹⁴ Para 7.1 (b) of the 'Loan Agreement' and Sub paragraph 2 of paragraph 4 of 'Separate Agreement'.

¹¹⁵ Deutsche Esisenbahn – Consulting (DE- Consult), Germany (main consultant) and Rail India Technical and Economic Services (RITES), sub-contractor to main consultant.

¹¹⁶ Para 2.3 (b) of the 'Loan Agreement' and Sub paragraph 1.1 (a) of paragraph 4 of 'Separate Agreement'.

¹¹⁷ At conversion rate applicable at that time

¹¹⁸ Electronic Inter-locking (EI) at way stations, Automatic Block Signalling (ABS) for sections. Laying of Optical Fibre Cable (OFC), Centralised Traffic Control (CTC), telecommunication works (Exchanges, Towers, Communication shelters, Cabling works and S&T works in big Yards.

¹¹⁹(i) Replacement of signalling gears by solid state interlocking (5 stations) on Ghaziabad-Kanpur and (ii) Track circuiting with automatic block signaling in golden quadrilateral/Rajdhani and Shatabdi route- Aligarh-Kanpur route

¹²⁰ Railway Board's letter No. 2012/Sig/E/2/KfW (disbursement) dated 09.02.2015.

4.2 Organisation Structure

Indian Railway Project Management Unit (IRPMU) is headed by Chief Administrative Officer (CAO) who works under the administrative control of General Manager (GM), North Central Railway (NCR), Allahabad. At Railway Board level, the matters related to IRPMU are dealt with by S&T Directorate headed by Member (Electrical) who is assisted by Advisors (Signal) and Executive Directors (Signal Project). Issues to be dealt at MoR and duties assigned to GM, NCR and CAO, IRPMU are exhibited in *Appendix II*.

4.3 Audit Objectives

Audit reviewed (2014-15) the records connected with the planning and execution of KfW funded S&T modernisation works on GZB-CNB route with a view to ascertain:

- I. Whether the planning for execution of works on urgent basis for S&T modernisation of GZB-CNB route was efficient and effective ;*
- II. Whether the execution of Project work through the contract awarded was efficient and effective;*
- III. Whether Fund Management for execution of externally funded works was efficient.*

4.4 Audit Findings

The major Audit findings noticed during the review of records at MoR, Ministry of Finance, NCR, IRPMU, New Delhi and site offices of various Engineers in the field were as under:

4.4.1 Planning Process

Ministry of Railways took up this safety project on urgent basis and to avoid hindrances in execution on account of scarcity of GBS, MoR arranged loan from KfW, Germany. The Bank had a right to refuse disbursement after December 2001. However, as brought out below, there were delays on various accounts at initial planning stage of this important sensitive safety project which delayed formation of IRPMU which was necessary to take up the initiatives for execution of Project work such as floating & finalisation of tenders and award of contracts-

- The 'Loan Agreement' between MoF and KfW was signed in August 1997. However, the 'Separate Agreement' between KfW and MoR

(executing agency), required to be executed immediately thereafter, was executed only in December 2000¹²¹.

- For the execution of major S&T modernisation works, although a Project Management Unit (PMU) was to be formed immediately after the execution of 'Separate Agreement', it could be formed only in May 2003 (IRPMU, New Delhi) as:
 - (i) The estimates of seven ongoing S&T modernisation works decided for inclusion in the scope of KfW funded Project work required revision / modification to KfW loan structure. Besides, four newly sanctioned works required their inclusion in Indian Railways Works Programme.
 - (ii) Although after the execution of 'Separate Agreement' between MoR and KfW in December 2000 the formation of IRPMU was required to be done on priority basis, MoR involved themselves in awarding a consultancy contract. The consultancy contract could, however, be awarded as late as in February 2003.
- KfW loan remained undisbursed till 31 December 2001¹²². The non-disbursement of loan was mainly on account of delay on the part of MoR in entering into 'Separate Agreement' in December 2000 and formation of IRPMU as late as in May 2003 only. This resulted in unnecessary avoidable payment of commitment charges of ₹ 8.26 crore till the formation of IRPMU.
- As per 'Separate Agreement', the Tender procedure should have commenced in August 2001 and tender finalized by March 2002. However, the Global Tender (GT) was floated in December 2003 and finalised in September 2005 at a cost of ₹440.45 crore in favour of M/s ASC registering delays of 28 months and 21 months respectively¹²³. Since the work for this important time bound safety project was required to be executed on turnkey basis and the execution involved technicalities of various nature, the tender was not finalized expeditiously. Delays in the formation of IRPMU and also in award of contract compelled MoR to revise the completion period of contract to July 2009.
- MoR was required to make with the assistance of Consultant the functional planning in regard to supervision of execution, including evaluation of the offers received against the tenders floated for the execution of work. A global tender for the Project work was floated in

¹²¹ *in view of a lengthy correspondence/ divergence of views between Minister of Railways (MR) and Railway Board in regard to necessity / usefulness of an exclusive Project for S&T modernisation besides modification in the scope of the project. MR's approval was in June 2001*

¹²² *as per 'Loan Agreement' KfW was contractually bound to disburse the loan by this date only*

¹²³ *Floating of a GT was delayed due to belated formation of IRPMU and the finalization of GT was delayed as Tender Committee met nine times between August 2004 and December 2004 and discussed on the Financial bid held seven times between March 2005 and May 2005. Railway Board also evaluated the tender finalization process seven times.*

December 2003 against which offers were received (in two packets system- financial bid and technical bid) from four tenderers which were opened in June 2004. The Consultant evaluated the offers received. Audit observed that:

- (i). The contractor to whom the contract was awarded (M/s ASC) after lengthy deliberations had been found technically unsuitable by the Consultant initially, as brought out in *Appendix III*. The offer of M/s ASC was considered by TC for award of contract and approval of the higher Authorities.
- (ii). During the process of evaluation of offers of the tenderers, the scores awarded by Consultant were ignored. The TC made M/s ASC, the initially unqualified contractor, the lowest bidder (L1). The position has been exhibited in *Appendix IV*.

When the matter was brought to the notice of Railway Board (February 2015), they stated (June 2015) that:

- I. 'Separate Agreement' is prepared after detailed design study and contains detailed scope of project and planning for implementation. The consensus and clearance of Planning, Traffic and Accounts Directorates was given in 2001 only.
- II. Assignment of consultant was avoidable as was mandated in 'Separate Agreement' and was primary requirement of KfW Bank. The late formation of IRPMU had no impact on the progress of work as consultancy contract was awarded in February 2003 and IRPMU, in May 2003.
- III. The views of consultant after tender evaluation were recommendatory in nature subjected to scrutiny of the Tender Committee and Tender Accepting Authorities. The technical suitability of M/s ASC was evaluated by a HAG level committee of North Central Railway.

Their contention was not acceptable as:

- I. The delay in entering into 'Separate Agreement' was in view of lengthy correspondence and divergence of views between MoR and MR. Signal Directorate had identified the S&T component of the Project in 1997. The clearance of Planning, Traffic and Accounts Directorates for this urgently needed safety project should have been arranged expeditiously. The fact that as per 'Loan Agreement' KfW had a right to refuse disbursement of loan after December 2001 was not kept under consideration.
- II. Had the consultancy contract been awarded and IRPMU formed early, the contract could have been awarded earlier making the execution of work possible besides avoiding payment of commitment charges.

- III. Since the technical unsuitability of the contractor was already established, consideration of technical suitability of contractor by HAG level committee was inappropriate. Opening of the Financial Bid of this contractor was also not regular as the Consultant had found it technically unsuitable.

4.4.2 Execution of Project

4.4.2.1 Progress of Work

As per the contract awarded to M/s ASC the project work was to be completed by July 2009. However, it was extended five times, latest up to 31 December 2014. Even by this date, the progress of work was 69 *per cent* only. The overall status of work at the end of March 2015 was as under:

- I. Electronic inter-locking (EI)¹²⁴ had been completed at 35 stations out of total 38 stations,
- II. Automatic Block Signalling (ABS) work had been completed on 43 stations out of 47 stations. In kilometre terms, work for 57 kms was remaining out of 410 kms.
- III. Laying of Optical Fibre Cable (OFC) had been completed for 866 kms out of 908 kms.
- IV. The work for Centralised Traffic Control (CTC) was severely lagging behind as the physical progress of CTC work was 14.63 *per cent* only and that too in the shape of construction of CTC building and installation of equipment. The work was at development stage only at seven stations (60 kms out of total 410 Kms).
- V. The status for completion of telecommunication works was – Exchanges- 33 out of 55, Towers-42 out of 61, Communication shelters-83 out of 144, OFC- 866 out of 908, Quad cable-382 out of 454 and GSM-R- 180 out of 755.
- VI. Electronic inter-locking and CTC works had been completed at only three major Yards out of total nine major yards.

As a result of slow progress, KfW had stopped funding¹²⁵ of the Project after December 2014 and MoR had decided to complete the balance work through GBS. The revised targets set by MoR for completing the remaining works was December 2015, except for remaining six major yards where the expected date of completion was between May 2015 and November 2016 for five major

¹²⁴ In Modern interlocking, the wired networks of relays are replaced by software logic running on special-purpose control hardware. The logic is implemented by software rather than hard-wired circuitry which greatly facilitates the ability to make modifications when needed by reprogramming rather than rewiring.

¹²⁵ As per CPM, IRPMU's MCDO issued to AM/Signal at Railway Board for the month of March 2015

yards and 2017 for Tundla Yard. With the expiry of the consultancy contract on 31 December 2014, the balance works were supervised by Engineers of IR.

4.4.2.2 Delay in Execution of Work

Audit observed that since commencement the progress of this highly needed safety project never matched with the urgency and importance of the project in view of which the project was funded through foreign loan. It was evident from the following chronological developments after the award of contract:

- I. By July 2009, the originally fixed target date for completion of contract the physical progress of the Project was 35 *per cent* only¹²⁶ after incurring expenditure of ₹ 142.27 crore. The contractor requested to extend the completion period up to 31 October 2011 on certain technical grounds brought out in *Appendix V*. IRPMU anticipated (July 2009) that around three year period would be required to complete the remaining work, including CTC works. IRPMU also observed that the work had been delayed on account of certain decisions of Railway and execution of balance work would need to be expedited for completing the work by 31 October 2011. However, Member Electrical (ML) had already directed (May 2009) to complete the work by 31 December 2009. IRPMU felt that the target was unrealistic as they expected that by that date the progress would be around 42 *per cent*. The date for completion of work was extended up to 31 December 2009 in October 2009, as per instructions of the ML.
- II. The contractor requested (February 2010) for further extension of completion period by 18 months. IRPMU observed in May 2010 that the progress of work after July 2009 was negligible on account of non-approval of various plans for want of finalized technical schemes. The contractor did not accept Railway Board's instructions (August 2009) for adoption of dual detection scheme (DDS) on remaining stations (excluding 12 stations where DDS had already been provided) and expressed their intention to execute the work as per scope of the contract. Due to ambiguity in contract, there were also a number of technical and contractual issues requiring Railway Board's decisions.

IRPMU, after getting a commitment from the contractor on commissioning programme and resource deployment to complete the work by the extended completion period, granted extension (June 2010)

¹²⁶ *EI work for 11 stations out of 38 stations and 14 block sections out of 33 block sections was only completed and that too with technical issues emerged after the commissioning. CTC work, EPBX network work and STM work was not commenced. The progress of other works was tower foundation (88 per cent), tower erection (51 per cent), CER foundation (23 per cent), CER erection (22 per cent) and OFC laying (62 per cent).*

up to 30 November 2011. The currency of KfW loan expiring on 31 December 2009 was also got extended for further two years.

III. There were a number of technical and contractual issues that were pending for decisions of MoR and RDSO when the completion period was last extended. These had adversely affected the progress of Project works that lagged behind considerably by extended target date of completion¹²⁷. During the extended period, the contractor erected only three towers and cast only one foundation. The CTC work was at preliminary stage only. Even the submission of the report of Independent Safety Assessor (ISA) for CTC operation was awaited. IRPMU observed that the contractor failed to achieve the milestones submitted by them primarily due to inadequate resource deployment. Despite an effective pursuance¹²⁸, the contractor did not accelerate the pace of work. KfW expressed (May 2011) their concern about slow progress of the work which had resulted in slow utilization of loan.

IV. Audit observed that IRPMU had repeatedly asked the contractor to submit their request for further extension of completion period. Besides slow progress of the contractor there were also certain reasons due to which extension in completion period was admissible under the provisions of clause No. 40 of the contract which allowed contractor additional time to provide additional facilities.¹²⁹

The contractor requested (October 2011) to extend the target date of completion up to 30 June 2012. IRPMU held that the non-completion of the work was on account of deficient performance of the contractor besides some other issues¹³⁰. The progress during the existing extended completion period mainly related to design work.

¹²⁷ *EI- at 22 stations out of 38 and 28 block sections out of 33. EI at wayside stations due to laying of third line (total 11 stations) and block sections (total 14 block sections) had not been started. EI had also not been started on nine large sections. Only 13 child exchanges out of total 54, one mother Exchange had been supplied. The supply of SDH equipments and of power supply equipments for Exchanges and SDH had been completed. Though tower foundations had been casted for 61 towers, only 34 towers had been erected. Construction of CTC building had only been started (October 2011).*

¹²⁸ *MoR and IRPMU had several meetings with contractor and issued several letters to accelerate the progress of work during the extended completion period.*

¹²⁹ *On Aligarh- Ghaziabad and Panki -BPU sections, the work for laying third line was in full swing necessitating creation of additional facilities within the scope of existing contract. Besides, other works related to yard remodelling at HRS, ETW, SKB, DER etc also required provision of additional facilities. These required additional planning, procurement of material and execution of work etc. The contract clause (No.40) allows contractor to request for additional time for providing additional facilities.*

¹³⁰ *(a) poor progress of sub-contractor on ETW-PNK section, (b) inadequate deployment of resources, (c) delay in supply of material specially telecom material, (d) inaction on fixed network work, (e) no progress/solution on SCADA, (f) bankruptcy of sub-contractor for GSM-R, (g) non-availability of site due to water logging in PNK-ETW section, (h) delayed decisions of MoR/RDSO (June 2011 to December 2011) on GSM-R solution, FAT on GSM-R equipment, cross acceptance by RDSO and supply of MSC/IN, (i) additional scope of work of modification of automatic signalling, (j) the progress of engineering/electrical works and (k) availability of CRS sanction, green notices/traffic blocks etc.*

- V. IRPMU further extended the completion period (January 2012) up to 31 December 2012 with Liquidated Damages (LD)¹³¹. This extension was granted after obtaining commitment from the contractor on commissioning programme and resource deployment for completing the work.
- VI. During the extended completion period, the contractor could not meet their commitment¹³². The contractor requested (June 2012) to extend the completion period up to December 2014. IRPMU observed that besides certain reasons¹³³, the progress of work lagged behind primarily due to inadequate resource deployment by the contractor. IRPMU also evaluated the reasons quoted by contractor while requesting for another extension in completion period and found them illogical. IRPMU contradicted contractor's observations as under:
- i. Non-construction of shelters and non-deployment of sufficient man power on ALJN-GZB third line might be reasons for the delay in respect of that portion only and not for the whole route.
 - ii. Although the approval of three phase Point machines was delayed by IRPMU due to change in vendor, the same had no connection with the delay in completing work for nine stations by the contractor.
 - iii. The contractor offered (in 2012) CTC material for inspection of the RDSO. The validation of RDSO was awaited as contractor had not replied to various observations made by RDSO.
 - iv. The delay in execution of GSM-R was mainly on account of slow progress of tower and shelter erection by contractor.

When IRPMU asked the contractor (December 2012) to submit target dates for completing the work of five major yards including their remodeling, the contractor refused to execute additional works and requested for its exclusion from the scope of the contract. IRPMU had no option but to extend again (January 2013) the completion period again up to 31 December 2013 with levy of Liquidated Damages¹³⁴.

¹³¹ This is a penalty which is imposed on the contractor when the delay in completing a work is due to the lapses of the contractor. Amount at a prescribed rate is deducted from the payment due for payment to contractor for work done during extended period.

¹³² The contractor commissioned signalling work at six wayside stations and five block sections only in CNB- ALJN section. Signalling work at seven large stations was not commissioned and no wayside station (out of 11) and block section (out of 14) related to ALJN-GZB third line was commissioned. Out of 54 child exchanges, 42 were to be installed. Three towers and 14 communication shelters were erected and 24 towers and 61 communication shelters were in balance.

¹³³ Inadequate resource deployment, poor progress of sub-contractor, inordinate time taken to initiate the work of ALJN-GZB third line and inaction on fixed network portion as well as and CTC.

- VII. Although the progress of work during the extended period was insignificant¹³⁵, the contractor requested (September 2013) for another extension in completion period up to June 2015 and submitted the milestones/ targets for completing the work, except Tundla Yard. The KfW loan was available only up to December 2014. Railway Board directed the IRPMU (October 2013) to complete all works by June 2014. The Chief Project Manager (CPM)/IRPMU observed (January 2014) that there was no improvement in the performance of the contractor and it would be a fit case to terminate the contract and *en cash* the Bank Guarantee. By that time, the HAG committee¹³⁶ had recommended that work of major yards should be got done through this contractor and thereafter, all stations would be linked with CTC. The CPM observed that with the existing pace, the contractor would be able to complete the work by December 2014. Accordingly, the completion period was extended up to December 2014 with LD, with stipulations that revised commitment by contractor for completion of all major yards including their re-modeling would be obtained from the contractor. It was thus evident that:
- i. Due to slow execution of S&T modernisation works, the date for completion of KfW funded contract had to be revised five times, last up to December 2014. Even the progress of work after this date was 69 *per cent* only. The slow progress of works had led to increase in cost of the Project by ₹ 291.24 crore¹³⁷.
 - ii. During 2003-14 (11 years), MoR had paid commitment charges to the extent of ₹ 28.63 crore due to non-disbursement of KfW loan. Out of this, a sum of ₹24.46 crore related to execution period after floating of tender (December 2003). Had the concerned Railway Authorities avoided the inordinate delay in award of contract¹³⁸, all the technical and contractual decisions taken prior to award of contract, technical and financial issues raised during execution of work could have been settled expeditiously and the pace of execution of Project work accelerated. By effective co-ordination with contractor, payment of a part of this amount could have been avoided and balance work (31 *per cent*) executed with KfW loan.

¹³⁵ *Commissioning of two way side stations and three block sections to be done with third line on ALZN-GZB Section and of one large station, nine child exchanges, erection of five towers only. The CTC work was badly lagging even the Train graph functionality had not been developed by the contractor due to which no trial was possible.*

¹³⁶ *Higher Administrative Grade*

¹³⁷ *Difference between original cost (₹445.57crore) and last anticipated cost as on 31 March 2015 (₹736.81crore).*

¹³⁸ *Six months time has been prescribed to finalise a tender after its opening.*

- iii. Till July 2009 (the original date of completion), the contractor had replaced only eleven signalling equipments (23 per cent). As of March 2014, 10 signalling equipments (21 per cent), installed between 1932 and 1980, whose replacement was due between 1957 and 2005 respectively had not been replaced. Delayed replacement / non-replacement of overdue assets had left the route vulnerable to accidents.

4.4.2.3 Technical Constraints and Solution

Although the technical advisor of Indian Railways (RDSO), an independent unit formed specifically for execution of Project work (IRPMU), Independent Safety Advisor (ISA), the contractor (M/s ASC) as well as a Consultant (M/s. De-consult and M/s RITES) were involved to ensure/ approve the appropriateness/quality of technology/ product, none of them proved to be adequately successful in deciding the technical issues effectively and efficiently. The Consultant, who was the technical expert appointed specifically on 'Single tender' and nomination basis, also did not provide suitable advice for ensuring appropriate technology/ quality of the products.

A detailed review in Audit connected with the execution of KfW funded works revealed that the main reasons for the delay in completion of S&T Project included following issues-

A. Electronic Interlocking (EI) of Microlok II make

The LOA issued (September 2005) to M/s ASC with the condition that the EI would be with hot standby¹³⁹ configuration. However, prior to execution of the formal agreement, provision of hot standby configuration would require certification of Independent Safety Advisor (M/s TUV). It was observed that NCR Administration, entered into the agreement (February 2006) with the contractor without waiting for the ISA certificate. In March 2006, RDSO permitted the provision of hot standby configuration on the basis of cross acceptance¹⁴⁰. The ISA provided their certificate in August 2006 only. However, IRPMU faced operational difficulties with the hot standby configuration provided. In view of this, RDSO withdrew (January 2009) their permission which was granted in March 2006 on cross acceptance basis and permitted IRPMU to use as interim measure the warm standby configuration.

RDSO resorted to the acceptance for hot standby configuration for way side stations in April 2011 and for yards in September 2011. Between January 2009

¹³⁹Hot standby is a system where alternate system always remains ready, without any lapse of time, to take up the operation in case of any failure in main system. Contrary to this Warm system remains in proactive stage and takes some time to be in active state to take up the operation in case of failure in the primary system.

¹⁴⁰ Cross acceptance is acceptance on the basis of successful implementation in another country.

and March 2011, the contractor had provided EI at 14 locations with warm stand by configuration which had to be retrofitted to hot standby configuration. As of July 2015, the works relating to EI in the remaining two wayside stations and at five major yards were pending. This indicated the lack of adequate technical skills of RDSO in EI works as they were liable to ensure provision of hot standby configuration smoothly.

RDSO stated (August 2015) that their approval of March 2006 to EI of Microlock II make on cross acceptance basis, was for its general use on IR. In respect of KfW funded works, the decision was to be taken by IRPMU. This was clarified in their letter (May 2009) also. RDSO approval to Hot standby configuration (October 2006) and withdrawal of approval in (January 2009) was also not specific to KfW funded works. The contract for project work was a complete design and build contract having an International Consultant. RDSO also stated that IRPMU already had their own pre-commissioning check lists etc., duly approved by them for all the equipments being used in the project and such works had inherent built in reliability criteria. RDSO observed that instead of using these criteria, IRPMU had tried to involve other entities such as RDSO, Railway Board, NCR etc. to disburse the issue.

The contention of RDSO indicated that its approvals/ instructions applicable for general use of configuration on IR was applied by IRPMU on their work being executed through design and build contract.

B. Centralised Traffic Control (CTC) works

CTC¹⁴¹ is in use on all high-performance Railways. Non-installation/delayed installation of CTC has the potential of compromising on increase in the capacity of Railway lines and efficient dispatching of trains. Besides, safety is also negatively impacted due to higher margin of human error within a decentralized system.

GZB-CNB route consists of six sections and the traffic at each station of the route is managed by a Station Master. It was proposed to centralise the control of Rail traffic on the route at Tundla providing six separate displays of each section and a common display reflecting all the six sections. The CTC work was included in the scope of contract awarded to M/s ASC.

Scrutiny of records relating to the status of CTC work revealed the following -

- CTC software had been developed for six out of 38 stations. Software for three stations had been tested.

¹⁴¹ CTC assists in optimising Railway operations through the centralised monitoring and control of traffic.

- CTC equipments had been shifted to CTC building at Tundla and CTC rack installed.
- M/s ASC had submitted proposal for change in CTC hardware and software, the documents of which were with RDSO for their validation.

The CTC work was badly delayed as the progress was around 12 *per cent* only. The various aspects impacting adversely on the completion of CTC work are discussed as under-

I. The location of CTC building and system

As per contract agreement, the CTC building was proposed for construction at Tundla (TDL) on the terrace at first floor of existing control office. However, there were following three options under consideration of IRPMU-

- Shift control office including CTC building to Allahabad (ALD).
- Retain CTC at TDL and the indication panel, at ALD.
- CTC at ALD with the option to operate from either of the places.

Ultimately, it was decided (May 2010) to establish CTC building at TDL as originally envisaged in the contract with parallel indication through Video Display Unit at ALD, using existing OFC cable. Evaluation of all these proposals and subsequent approval of the original proposal took five years.

As the existing control building at TDL was more than 40 years old it was felt (April 2012) that the building would not be able to bear the load of RCC roof. Hence, it was decided to construct Galvalume sheeting roof supported on built up steel truss resting on the RCC beams. Subsequently, Member Electrical (ML) decided as late as in May 2012 that a new building may be constructed exclusively for CTC purpose under a separately sanctioned work and structure already constructed for CTC building as per the existing planning might be put to alternate use. The new CTC building had been completed in January 2013. The decision of the ML to construct a new CTC building was taken after about three years from the initial date of completion of contract (July 2009).

Further, indecisiveness of the Railway to construct a building for CTC at Tundla on an existing old building and delayed decision later to construct a separate building exclusively for CTC work led to delay. This was indicative of poor initial planning and inconsistency in taking decisions.

II. Technical constraints due to delay in taking up CTC work

Delay in resolving various technical issues that emerged during execution of CTC resulted in delay in execution of work as described below:

- i. Initially it was decided to use PUMA model in the CTC. However, due to delayed construction of CTC along with negligible progress of CTC work, this model became obsolete. The contractor submitted documents for revising hardware/software of CTC system. They proposed (July 2013) for using a new model (Margey II). This proposal was approved by CAO/ IRPMU in May 2015 only.
- ii. M/s ASC submitted in June 2013 a proposal to replace Phoenix CTC system by SCC CTC system. As per records, the acceptance of the proposal was awaited (September 2014).
- iii. No specific details of the hardware to be used for CTC work were provided in the contract. The only hardware specified was the Wall display that had, however, become obsolete and replaced by a more advanced hardware by the same manufacturer. RDSO desired (December 2012) to know from IRPMU Authorities whether CTC system components proposed for the project had been used in other countries and also requested to make available the user certificates along with the changes made in hardware & software. Reply of IRPMU in this regard was awaited (July 2015).
- iv. Due to various technical aspects even the Hazard analysis¹⁴² was pending on the part of with IRPMU (July 2015).

III. **Safety and Integrity Level certification of CTC**

On the directions of the Railway Board (March 2014 and May 2014), a committee¹⁴³ met in June 2014 to decide on various Safety and Integrity Level (SIL)¹⁴⁴ requirements. There was difference of opinion and hazard analysis was not acceptable to IRPMU/DBI/RDSO. A corrigendum to the Minutes of Meeting (June 2014) was issued in July 2014 and the feasibility was confirmed. M/s. ASTS submitted a proposal with two emergency / relief terminals. IRPMU and DBI agreed to separate Emergency Relief Operations Workstation with minor modification.

Further, the complete CTC system was to be assessed by an authorized ISA regarding software safety, integrity level, personnel competence and independence of roles, verification, software integration test, Software/Hardware integration test, quality assurance test, maintainability etc. However, neither was an assessment report of ISA available nor any information/status about conduct of assessment by ISA intimated to Audit.

Thus, it was observed that due to delay (five to six years) by MoR in deciding the location of CTC building at Tundala, CTC work could not

¹⁴² *This is a first step to assess the risk involved in a process*

¹⁴³ *comprising RDSO, IRPMU, M/s ASTS - a member of the consortium of vendor and M/s DBI*

¹⁴⁴ *Measurement of performance of a safety instrumented function.*

progress and the related technical products became obsolete necessitating use of alternate products/technologies. There were also delays in approving the newly adopted technical products/technologies.

RDSO stated (August 2015) that they are technical advisor for IR and not for IRPMU. They do not carry out the work for validation of software/ hardware, Safety Integrity Level etc as for which IRPMU had their own Independent Safety Assessor who worked with their collaboration. The contention of RDSO indicated that they were unnecessarily involved in the issue and the work was related to ISA.

4.4.2.4 Change in Scope of Work

Audit observed that there were major changes in the scope of work as described below-

I. Linking EI installation at big yards to the remodeling of big yards and provision of 3rd line in ALJN-GZB section

After the commissioning of EI at Juhi (near Kanpur), RDSO approved (September 2011) the architecture of EI at big yards. MoR decided (November 2012) that the EIs at seven big yards (excluding Barhan and Shikohabad) would be commissioned along with the sanctioned works of yard remodelling. However, as per the scope of the contract awarded to M/s ASC, the EI at nine big yards¹⁴⁵ was to be done without yard remodelling. Audit, however, observed that:

- For EI of Hathras yard, Engineering Signal Plans (ESP) had been finalized in December 2008 and the Signal Interlocking Plan (SIP) approved in November 2011. EI of Hathras yard was commissioned in October 2013. Prior to this, EI work at Barhan and Shikohabad yards had been completed between 2012 and 2013. However, there were successive revisions in ESPs of the remaining Yards on account of modifications desired by various departments of NCR.
- There were delays in design analysis of ESPs by M/s ASC as some of their observations were communicated to IRPMU in April 2013 only. There were also delays in approving the designs by IRPMU due to submission of raw drawings by contractor without adequate checks at appropriate level.
- Ministry of Railways sanctioned (2003-04) third line between Aligarh (ALJN) and Ghaziabad (GZB) which needed suitable addition in the EI being provided. Such incorporation required modifications in the existing proposed EI system which led to delays in finalization of ESPs

¹⁴⁵ Barhan, Shikohabad, Hathras, Etawah, Panki, Aligarh, Khurja, Dadri and Tundla

and subsequent submission thereof by M/s. ASC to MoR for approval. The commissioning of EI at these big yards had been delayed as reflected in table below:

Table No. 1: Status of completion of electronic interlocking works in major yards

Yard	No. of revision in ESPs	Finalization of ESPs	Submission of SIPs	Approval of SIPs	commissioning of EIs	Target date for completion
Etawah	4	April 2015	January 2015	February 2015	July 2015	commissioned
Panki	4	January 2014	February 2014	March 2014	Not done	March 2016
Tundla	4	March 2014	May 2015	Not approved	Not done	March 2017.
Aligarh	2	September 2014	November 2014	November 2014	Not done	June 2016
Khurja	1	December 2013	February 2014	March 2014	Not done	December 2015
Dadri	1	January 2014	December 2013	January 2014	Not done	March 2016

This indicated that lack of co-ordination amongst different entities within IR led to significant changes in the scope of work further hampering the completion of already delayed project

II. Work relating of provision of Audio Frequency Track Circuiting (AFTC).

As per contract, the automatic signalling of the route was to be done with AFTCs. Two issues emerged in this regard, one for maximum length of end fed and center fed AFTC and the second for use of AFTC equipment manufactured by M/s Keynes India. First issue was resolved in February 2011. For resolving the second issue, RDSO evaluated at the insistence of M/s ASC the AFTC equipment manufactured by existing vendor and advised for change of vendor that was approved (June 2011). This necessitated retro-fitment of AFTCs in sections already commissioned. This work could be completed by July 2013. It was observed that:

- Ministry of Railways decided (November 2006) to use dual detection system¹⁴⁶ at 12 stations and associated block sections and only DC track circuit at stations. This decision had impact on certain activities¹⁴⁷. Meanwhile, automatic signaling had been commissioned in three

¹⁴⁶ Use of AFTC and Axle counters working in parallel at 12 stations and associated block section and only DC track circuits at stations.

¹⁴⁷ (a) SIP, Selection Table, interface circuits, application logic preparation etc (b) Cable core allocation charts and other field designs preparation, (c) Power supply requirement of LSC and stations, (d) Material procurement and (e) Assessment of hazards of such system.

sections¹⁴⁸ without using dual detection. Indian Railways had the experience of AFTC failures mainly on account of theft and vandalism leading to failures of Automatic Signals and detention of trains. To overcome the problem, Railway Board decided (January 2007) to use dual detection at all stations and block sections. However, this decision was communicated to executing authorities in April 2009 only. The work as per Railway Board's directives could be started only after June 2009.

- The contract did not have the provision for continuous use of DC Circuit at LSCs (Line Side Cabinet) and stations. Besides providing for this, the implementation of decision necessitated the preparation of cable core allocation charts and field designs which affected the procurement of material. At those stations where work had not been taken up by that time, changes like additional shunt signals and provisions of Stand Hump/dead ends etc. had to be carried out.

III. Work relating to installation of Mobile Switch Centre/Intelligent Network (MSC/IN) and Mobile Train Radio Communication (MTRC)

Initially, MSCs/IN for the Project was to be procured and installed at two places (Tundla on the route and Secunderabad for training purpose). However,

IR dropped (December 2011) the proposal for installation of MSC/IN at Secunderabad and also changed the location of MSC/IN from Tundla to Kolkata. The change in planning was made after 30 months from the initial date of completion of contract (July 2009).

Audit observed that:

- MSC/IN had not been installed (July 2015) at Kolkata as change in location from Tundla to Kolkata necessitated the involvement of three Zonal Railways.¹⁴⁹ Further, MSC/IN could function only after the erection of all the remaining Towers in New Delhi- Howrah route. The pace of erection of Towers had been slow thereby further delaying the achievement of desired benefits of telecommunication.
- The work of Mobile Train Radio Communication (MTRC) on GZB – MGS section was to provide better communication facility among officers and staff of operating and Railway station. MoR applied for the license of spectrum¹⁵⁰ (May 2007) and the frequencies in GSM band with Spectrum Charges revisable from time to time was allotted

¹⁴⁸ TDL-HNG, HNG-FZD and JJK-KNS

¹⁴⁹ ER, ECR and NCR

¹⁵⁰ To Ministry of Communication & IT, Department of Telecommunication (WPC Wing), New Delhi.

(July 2007) by the concerned Ministry. However, the work for Exchanges and Towers on GZB-MGS route could not be completed due to reasons such as change of vendor¹⁵¹, delay in tower erection and delay in approval of MTRC equipment (FAT and MSC/IN) by RDSO and the facility of MTRC could not be utilized. Payment of ₹ 24.09 crore towards spectrum charges had been made for the period July 2012 to March 2014 without any use/benefit of spectrum frequencies.

IV. Work relating to supply and installation of Towers and Shelters

A contract was awarded (February 2006) to M/s Leighton Asia (Southern) Limited¹⁵², a consortium of five partners, for supply and installation of Towers and Shelters en-route. The Consortium changed the responsibility to M/s. MRT Signals Ltd and informed (November 2006) their decision to Railway for its acceptance. Although there was no approval for the change in executing agency, M/s. MRT Signals commenced the work and submitted a bill in August 2008 for 19 out of 31 Towers erected by the firm¹⁵³.

It was seen that the payment had been denied as the work was not executed by M/s Leighton Asia (Southern) Ltd., the appointed agency. Railway Board, however, decided (April 2011) that required change was related to change in the responsibility of execution of work and could be made at Railway's level with necessary vetting. IRPMU advised (December 2011) M/s. ASC to submit undertaking to the effect that the work would continue pending decision on their request. They were also asked to adhere to the commercial terms and absorb associated costs. Although work was being executed by the changed agency, no decision had been taken by Railway for making payment and as a result, erection of 19 Towers remained pending (July 2015).

4.4.2.4 Other Contractual Changes

A. Change of vendor

As per contract agreement, GSM-R equipment¹⁵⁴ was to be supplied by M/s. Nortel. No work was executed by them till January 2009 when they filed for bankruptcy protection. M/s. ASC, therefore, requested (January 2009) that supply of GSM-R be obtained from M/s. Nokia Siemens. IRPMU agreed to the proposal in principle as late as in June 2010 only. The work was held up during the intervening period.

¹⁵¹ from M/s Nortel to M/s Nokia Siemens,

¹⁵² now Leighton International Limited

¹⁵³ As per the contract, the firm was to erect 61 towers

¹⁵⁴ Global system for mobile communications of Railway

B. Change of currency for payment

As per contract agreement, the rate of Synchronous Digital Hierarchy/Synchronous Transfer Mode (SDH/STM) equipments was quoted in USD currency. The contractor informed (April 2009) Railways that although quoted currency value was in USD, country of origin of these items was India. It was requested for allowing invoicing of these items in Indian currency with conversion rate of contract. The Contractor also submitted (August 2009) a request for change in currency of these items. Railway Board decided (April 2011) that change in currency should be done by the Tender accepting Authority. The decision on the issue was pending with the Railway (March 2015).

C. Performance and reliability of equipments installed by contractor

It was observed that:

- RDSO had brought to the notice of the Railway Board (September 2011) the poor reliability of various signaling assets. Out of almost 350 IPSs provided, there had been failures of 12 IPSs. Due to increase in failures, RDSO stopped inspection of two vendors and issued instruction to all the suppliers of various signaling assets to conduct auditing of IPS installations and attend to existing deficiencies and defective cards.
- RDSO developed new design with static switches to check the problem of change over to inverter. The specification of LED signals was revised with improved current regulator and integrated LED signals which were likely to arrest the failure rate. Failure of AFTC was on the higher side mainly due to track lead connections, loose contact, rusting of nuts and bolts, OHE masts connected at ESJ section, non use of proper insertion/removal tools resulting in loose connection, cable not crimped properly, problem due to rails immersed in ballast during TRR works etc.
- There were excessive failures of EIs installed by M/s ASC and an action plan was drawn up to arrest the same. The corrective action was delayed as a result of which RDSO had to stop further inspection of EIs. Action plan for improvement of Level Crossing gates including provision of double magnets was drawn in 2011. Audit observed that there were instances of 56 EIs failures during the 2012-13 despite implementing the action plan decided by the apex level meeting in the Railway Board. The failure of component / part was leading to failure of entire system indicating serious design defect in the logic of the system. CSTE had recommended for a third party validation of the whole system to ensure proper reliability and long term sustainability. In addition to the above, CSTE also noticed (November 2013) the

frequent failures of LCPs with new phenomenon of communication fault. Total train operation was severely affected for 20 minutes on 31 October 2013 due to failure in golden box at Achhalda station. There were 21 cases of failures of LCPs in September and October 2013 (maximum being for 42 minutes) badly affecting the total train operation due to heavy detention of trains.

Thus, poor reliability of signaling assets and slow pace in rectifying the failures on account of these, besides change in specification, design etc. delayed the completion of the Project. These frequent failures of LCPs of EIs in GZB-CNB section resulted in delay in completion of the project.

RDSO stated (August 2015) that their instructions are for IR and not for IRPMU. The role of RDSO was never intimated to RDSO by IRPMU.

D. After effects of various changes in scope of works and lack of co-ordination among Railway Authorities

The changes in the scope of works necessitated item rate based negotiations between M/s. ASC and MoR which made a lump sum turnkey contract into a normal contract. The summary of proposals for change in the scope of work and their status has been exhibited in *Annexure 1 and Annexure 2*. Audit observed that the coordination among Railway Authorities was inadequate as described below-

- i. MoR and IRPMU failed to ensure pre-requisite conditions of tender and sanction of estimates. This failure necessitated multiple changes in the scope of work leading to delay in execution of work as well as cost overrun.
- ii. Preparation and approval of signaling plans, cable route plans, cable laying scheme, circuits diagrams, designs and drawings were necessary prior to execution of works, these were required to have been prepared and approved by the Competent Authority prior to execution of work. However, there were many post agreement contractual technical issues before IRPMU. They had been pursuing these issues with MoR and RDSO. They had also requested several times for delegation of powers. MoR, however, only delegated (in February/ April 2011) the powers to deal with contract matters not involving change in payment conditions¹⁵⁵ to IRPMU. After this, IRPMU was able to settle some contractual issues.
- iii. IRPMU was to be the effective arm for the project. General Manager, North Central Railway and Member Electrical in MoR were to perform designated functions for the project on proposals received by them from

¹⁵⁵ *Railway Board letter No. 2011/Sig/KfW/Rev. Dated 02.02.2011 and No. 2006/Sig/KfW/Rev/Loose 2 dated 18.04.2011.*

- IRPMU and also to give directions to IRPMU. However, the proposals were dealt with by them in a routine manner as originating from a regular subordinate formation. The technical skills of Railway officials and their partners to undertake the project introducing advance technologies on IR were also assessed to be weak.
- iv. Most of the changes required to be made in the contract were as a result of post agreement decisions/ directions of MoR/ RDSO. IRPMU referred issues related to these changes to GM/NCR and MoR for decision/ guidance. However, the references made to MoR were generally disposed of with the directions to IRPMU to deal them as per terms and conditions of the contract agreement. Since the contract envisaged introduction of advanced technology in IR, the MoR was required to provide specific guidance expeditiously. MoR had also not delegated any power to GM/NCR to resolve the issues for timely completion of Project works except that provided in April 2011 in respect of non-financial matters.
 - v. The contract awarded to M/s ASC was a Design and Build contract wherein involvement of RDSO was not envisaged. However, MoR involved RDSO in the project working as technical monitor. Their advice/approval on products/technology had to be reversed as in the case of EI work.
 - vi. Despite financial implications, many proposals submitted by contractor to MoR for making changes in the scope of work were either not resolved or were resolved late. Even the change proposals not involving financial implications were pending.
 - vii. The fortnightly meetings between M/s ASC and IRPMU covered issues like progress of works, filling of Measurement Books and pending change proposals etc. The status / outcome of each of such meetings were to be signed by both the parties. However, by October 2014 M/s ASC had started to send unilateral weekly reports containing misleading information not reflected in the minutes of joint fortnight meetings. IRPMU recognized (October 2014) that misleading weekly reports by M/s ASC were intended to be used in the event of Arbitration, as threatened by them now and then. It is apparent that the pending of many technical issues / change proposals particularly at MoR level carried the risk of use of Arbitration/ Judicial forum by M/s ASC. Despite such a threat, there was a lack of sensitivity in this regard for want of suitable internal control mechanism. As a consequence, IRPMU could be a soft target to face the adverse impact of decrees/ pronouncements.
 - viii. As already stated in Paragraph 4.4.1- Appendix III and IV, the offer of M/s ASC against the Global Tender floated for the execution of this specific safety work involving advanced technology was not found to

- be technically suitable by the Consultant. The engagement of M/s ASC proved to be a reason for many changes in the scope of work as well as lack of delivery of quality product/technology. It is important to mention that there was not a single instance where design submitted by M/s ASC had not been corrected by IRPMU/ Consultant (DBI) which involved considerable time in observing mistakes and their rectification.
- ix. The engagement of Consultant for this project through contract (December 2003) was based on the advice of a survey agency who studied on behalf of KfW the feasibility of this project prior to loan agreement. The advice was based on surveyor's views that IR personnel had no experience in design, installation and maintenance of electronic interlocking. Interestingly the contract was awarded on 'Single Tender' basis to the Surveyor who recommended it. Certain duties¹⁵⁶ assigned to the Consultant were of routine nature and were already being performed by IR Engineers in the seven ongoing S&T modernisation works that were merged (2002) in the scope of project work. Even with the engagement of a Consultant, the technical contractual issues could not be resolved quickly and efficiently resulting in association of RDSO and verification/certification of ISAs for the products and technology being introduced. Effective evaluation of technical capabilities of key personnel of the partners of the consortium of consultants did not appear seem to have been done. The competence of the Consultant for such a modernisation project was required to be assessed as the consultancy charges payable to them were substantial.
- x. The IRPMU Engineers and technical staff monitor and certify the work executed by the contractor. There were cases where M/s. ASC was carrying out the work without any authorized acceptance for required change. For example, instances of the supply of EPROM PCB and CPU from indigenised firm instead of USA, changing the responsibility of consortium partner for GSM-R tower work, requesting change in currency for control unit basic hardware (Moxa, RS 232OF modem & serial com cable) and vendor change for AFTC from CSEE France to *Keynes* India and Phoneix CTC system to SCC CTC system may be mentioned.
- xi. In view of KfW's decision not to disburse loan beyond December 2014, MoR decided (February 2015) to execute balance S&T modernisation work by utilizing GBS. As a result, the estimates already modified to suit the requirement and provisions in accordance with KfW loan conditions, would require further revision to suit domestic conditions for GBS.

¹⁵⁶ (i) Preparation of draft Project report, finalization of tender specifications and documents, (ii) Preparation of final evaluation report of the bidder,(iii). Check of system design, drawing and documentation, preparation of test / test protocols and (iv). Supervision of the execution of site work, testing of equipments, sub-system and integrated system as a whole and commissioning of the projects.

It was evident from the above that the urgency shown by MoR for availing of the external fund arrangement did not match the pace of execution of work. Significant increase in line capacity and safety levels through introduction of improved/modernized systems¹⁵⁷ could not be achieved even after six years from the initial date of completion.

4.5 Fund Management

A review of sanctioned estimated costs of works, provision of funds vis-a-vis actual expenditure incurred in respect of works funded by KfW works during the review period i.e. 2009-10 to 2013-14 revealed the following-

- i. In order to avail KfW loan, MoR decided (February 2001) that revisions/modifications required in the already sanctioned works would be processed as per normal procedure and that new works would be processed for sanction for inclusion in Pink Book 2002-03. As such, seven already sanctioned works estimates required revision/modification in accordance with the conditions imposed for loan by KfW and in respect of four new works, action was to be taken for sanction and preparation of estimates. Out of 11 works forming part of project, three works¹⁵⁸ had not yet been sanctioned (March 2014) as per KfW loan conditions and estimates of other works were revised/ modified with delays (4 to 24 months).
- ii. There were defects in budgeting in respect of eleven KfW funded works. MoR could not anticipate the actual requirement of funds either at the stage of original budget grant or at final grant stage. The original budget grant for KfW funded works for the period 2009-14 was ₹535.29 crore which was reduced to ₹354.41 crore (34 per cent reduction) at final grant stage. Against it, the actual expenditure incurred was ₹304.94 crore resulting in surrender of 14 per cent of funds (₹49.47 crore). The overall surrender of funds with reference to original budget grant was ₹ 230.35 crore (43 per cent). Further, in respect of one work¹⁵⁹, the actual expenditure incurred was 61 per cent less than the final budget grant. The work-wise position is depicted in *Annexure -3*. This indicated that the progress of works was slow as substantial amount had to be surrendered.
- iii. On the other hand, although the expenditure incurred on four works had exceeded (March 2014) the sanctioned estimated cost by ₹32.80 crore (30 per cent), the estimates of those works had not been revised to regularize the unsanctioned expenditure. The reasons for getting excess final grant

¹⁵⁷ Centralized Electronic Interlocking, ABS, Automatic Train Stop System/Auxiliary Warning System and Train Radio and Optical Fiber Communication system.

¹⁵⁸(i). GZB-CNB: Replacement of signalling gears by SSI (5 stations), (ii). GZB-TDL: Replacement of signalling gears by SSI (7 stations) (iii) GZB-ALJN: Automatic Signalling.

¹⁵⁹ GZB-TDL: Replacement of signalling gears by SSI (7 stations)

sanctioned and non incurrence of expenditure to the required extent were not available in IRPMU records.

- iv. Initially, the amount admissible against KfW loan was Euro 94.40 million and the same was decreased to Euro 64.40 million due to surrendering of loan amount, de-scoping of some works from the overall scope of project. Of them, 67 per cent (43 million Euro) of the loan could be utilised by December 2014.
- v. MoR anticipated (31 March 2015) the latest cost of the project at ₹ 736.81 crore registering an increase of ₹291.24 crore (65.36 per cent) in the earlier original/ revised cost (₹ 445.57 crore). The expenditure incurred till March 2015 was ₹ 510.09 crore (69 per cent). It was observed that at least a sum of ₹ 226.72 crore would be required from GBS to complete the work as is evident from *Annexure -4*.
- vi. As per Railway Board circular¹⁶⁰ and clause 62 of the General Conditions of Contract, the contract agreement should be signed within 28 days from date of issue of letter of acceptance (LOA) and in case of failure, amount deposited as earnest money with bid is to be forfeited by Railways. M/s Ansaldo Signal Consortium entered into the contract agreement on February 1, 2006 (after 110 days from the date of issue of LOA, 28th September 2005). In spite of this, IRPMU Administration had not forfeited the earnest money of the contractor amounting to 2.5 Million Euro (March 2014).
- vii. Although MoF was required to make payment of commitment charges to KfW towards undisbursed amount of loan and they had made payment of ₹28.63 crore¹⁶¹ up to March 2014, IRPMU Administration had unnecessarily paid commitment charges valuing ₹ 8.26 crore¹⁶² (February 2004) to MoF.
- viii. MoR was required¹⁶³ to provide funds from GBS for bearing the local costs and duties. As per Railway Board's orders, a Railway Organisation is required to provide in the estimates of works the Direction and General (D&G) charges¹⁶⁴. Railway Board has prescribed provision of D&G charges at the maximum rate of 14.83 per cent and 10.69 per cent respectively in respect of S&T projects requiring traffic blocks and those not requiring traffic blocks respectively. Efforts were required to be made to restrict the actual provision to the barest minimum.

¹⁶⁰ Railway Board circular no. 64/W2/CT/28 dated 05.07.1983

¹⁶¹ Statement of Commitment charges on undisbursed amount of loan made available by MoF

¹⁶² Bill no. F-291 dated 03.02.2004

¹⁶³ As per Loan Agreement

¹⁶⁴ D&G charges cover the cost of gazetted and non-gazetted staff required to provide & supervise and give directions during the execution of works besides other expenditure such as Plant construction, temporary accommodations, residential accommodations, instruments and contingencies etc, mentioning the ceilings in percentage terms.

- ix. The assessment of requirement of material for KfW funded works was done by the Consultant, the technical expert. However, the quantities of Signalling cable, quad core cables and Optical Fibre Cables made available to M/s ASC (6691 kms) were in excess of the scheduled contract quantities (3019 kms) and quantities of cables (3672 kms) worth ₹52.98 crore procured in excess of requirements were lying in stock at Tundla Depot (March 2014).
- x. For levying D&G charges, IRPMU derived a uniform rate of 13.68 *per cent* in view of the fact that execution of some KfW funded works involved traffic blocks and some did not. As per Works Registers, D&G charges booked to works were 19.02 *per cent* for 2011-12, 18.30 *per cent* for 2012-13, 33.28 *per cent* for 2013-14. IRPMU had no control over increasing trend of D&G charges as it registered increase between 4.62 *per cent* and 19.60 *per cent* during 2011-15. Further, although in normal course the supervision, inspections, maintenance and other related activities are performed by the Railway Officers/ Engineers posted in the Project, a Consultancy contract was awarded in respect of execution of 11 KfW funded works. However, the consultancy charges (Euro 6.72 million payable up to December 2013) were not included in the D&G charges booked by IRPMU. Had it been done, the rate of D&G charges would have been further increased substantially.

Thus, although the loan from a German bank was taken due to fund constraint, the same could be utilized to the extent of 67 *per cent* only. Due to slow progress of works substantial amount out of initially allotted budget grant and also of revised final grant had to be surrendered.

4.6 Conclusion

In view of the urgency involved in modernisation of S&T system on Ghaziabad (GZB) – Kanpur (CNB) rail route, IR took up the project for execution through IRPMU arranging a loan from a German Government owned Development Bank.

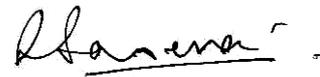
The preparedness of Indian Railways prior to award of contract was not adequate due to which many post agreement contractual and technical issues emerged which required a substantial period of time for settlement.

The scheduled date of completion of major contract was fixed as July 2009. However, the progress of the project was 35 *per cent* only till July 2009. Despite several extensions, the progress of projects was 69 *per cent* only (December 2014). Due to slow progress of works, ‘Loan Agreement’ with KfW was terminated in February 2015. MoR, therefore, decided to get the balance work completed utilising GBS. MoR took up this sensitive and important safety project on urgent basis. However, delays on various accounts

at initial planning stage delayed the formation of IRPMU. This had led to the delay in award of contract. KfW loan remained undisbursed till the formation of IRPMU resulting in avoidable payment of commitment charges amounting to ₹28.63 crore till March 2014. Indian Railways failed in achieving the intended objective of the project even after a decade.

4.7 Recommendations

- i. *In absence of foreign financial support, MoR needs to frame realistic timelines and ensure their adherence for timely completion of the balance works of the project and also ensure optimal utilisation of Gross Budgetary Support.*
- ii. *For all future modernisation projects, MoR needs to ensure compliance of requisite preliminary formalities such as finalisation of designs, specifications, technologies and other related issues prior to award of contract for smooth progress of the project.*
- iii. *To avoid consequences of arbitration/court cases, MoR needs to ensure timely decisions on all technical matters during execution stage.*



(SUMAN SAXENA)

Deputy Comptroller and Auditor General

New Delhi

Dated: 23 November 2015

Countersigned



(SHASHI KANT SHARMA)

Comptroller and Auditor General of India

New Delhi

Dated: 23 November 2015