

Faster, Quality and Economic Construction of New Line and Doubling Projects by NR-CON.

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The growth of Railway Infrastructure is being given much desired push by the Government through enhanced funding including long term financial planning. New Line and Doubling projects are now required to be executed not only faster, but with quality and in economic way to fulfill the enhanced expectations. Measures adopted by NR Construction Organisation in recent past in reference to faster, Quality and economic construction are briefed in this paper. Due to space constraints, consequential economic benefits of only few measures are given in detail, such as review of Blanket requirement, Efficient alignment to reduce land/tunnel/bridge requirements and elimination of RoBs by using RuBs, issue and use of standard tender schedules etc. The other measures are given in brief through bullet points only. The economy achieved through some of these actions resulted into saving of Crores in the recent past, which was appreciated by the Minister of Railways through special award of Rs. 10 lakh to encourage innovations further. The less cost of work itself ensures faster construction due to use of lesser material and other resources and further results into carbon credits. The opening of any section at maximum permissible speed and appreciation by CRS announcing new track as "Outstanding" proved to be a feather in cap of NR Construction Organisation for quality working. Opening of 188 KMs section in first nine months of a year has been a record at NR level itself and best performance among all Railways.

1.	<p><i>COST SAVING BY REVIEW OF BLANKETING:</i></p> <p>The requirement of Blanketing has been reviewed and provided on need basis and keeping in view of the locally available material.</p> <p>1.1 In 27 km doubling of Mansa-Bathinda section, soil investigation was carried out and it was found that the existing soil is SQ-2 type. Therefore, in reference of RDSO guidelines GE: 0014, the thickness of the blanketing material has been reduced from 60 cm to 45 cm which has resulted into saving of Rs. 2.25 crore.</p> <p>1.2 In 55 km doubling of Meerut-Muzaffarnagar section, soil investigation was carried out and it was found that the existing soil is SQ-2 type. Therefore, in reference of RDSO guidelines GE: 0014, the thickness of the blanketing material has been reduced from 60 cm to 45 cm which has resulted into saving of approx. Rs. 10.00 crore.</p> <p>1.3 In 22 km of doubling of Dhappar-Chandigarh, the soil investigation has been carried out and it was found that the existing soil is SQ-2 type. Therefore, in reference of RDSO guideline GE:0014, thickness of blanketing material has been reduced from 60 cm to 45 cm. In addition, the use of river bed material in place of stone crushed material as blanketing has been permitted due to nearby available river bed material. This has resulted into saving of approx. Rs. 5.8 crore.</p> <p>1.4 The thickness of the blanketing has been reduced to zero on the 5TH &</p>
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	<p>6th LINE between New Delhi-Tilak Bridge due to low speed potential resulted into the saving of Rs.1.32 crore.</p> <p>1.5 Blanketing was fully eliminated as soil was very good in Nangaldam-Talwara section..</p>																				
<p>2.</p>	<p>REVIEW OF ALIGNMENT OF CHANDIGARH-BADDI NEW LINE :</p> <p>The detailed survey of Chandigarh –Baddi New Line has been done based on the instructions of General Manager, Northern Railway during his visit of the site in November 2013. Based on the revised survey, the length of the New Line has been reduced from 33.23 km to 27.667 km. The details of savings achieved in the new alignment are as under:</p> <p>➤ Savings achieved in the revised alignment is about Rs. 420.00 crore.</p> <p>1. Saving in the cost due to change in alignment</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">Saving in length of section (33.23-27.667)</td> <td style="text-align: right;">= 5.563 km</td> </tr> <tr> <td style="padding-left: 20px;">Cost per km. (E/W + track & bridges)</td> <td style="text-align: right;">= Rs. 12.94 Crore</td> </tr> <tr> <td style="padding-left: 20px;">Total Saving (5.563 x 12.94 cr)</td> <td style="text-align: right;">= Rs.71.99 Crore</td> </tr> </table> <p>2. Saving in land area due to reduction in length of section.</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">Reduction in land area (216.534-171)</td> <td style="text-align: right;">= 45.534</td> </tr> <tr> <td style="padding-left: 20px;">Cost of land per Hect.</td> <td style="text-align: right;">= 5.66 Crore</td> </tr> <tr> <td style="padding-left: 20px;">Total Saving (5.66 Cr x 45.534)</td> <td style="text-align: right;">= 257.72 Crore</td> </tr> </table> <p>3. Saving in cost due to reduction in length of Tunnel/cut and cover</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-left: 20px;">Reduction in length of tunnel/cut & cover (6.174-1.56)</td> <td style="text-align: right;">= 4.614 Km.</td> </tr> <tr> <td style="padding-left: 20px;">Cost of Tunnel per Km.</td> <td style="text-align: right;">=27.60 Crore</td> </tr> <tr> <td style="padding-left: 20px;">Total saving (4.614x27.60)</td> <td style="text-align: right;">=127.35 Crore</td> </tr> <tr> <td style="padding-left: 20px;">Gross saving (1+2+3)</td> <td style="text-align: right;">= Rs.457.06 Crore</td> </tr> </table> <p>Less Addl. cost due to temp. diversion bet. Chandigarh-Chandi Mandir section & re-Grading of CNDM yard. = Rs. 37.00 Crores</p> <p style="text-align: right;">NET SAVING= Rs. 420.06 Crore</p>	Saving in length of section (33.23-27.667)	= 5.563 km	Cost per km. (E/W + track & bridges)	= Rs. 12.94 Crore	Total Saving (5.563 x 12.94 cr)	= Rs.71.99 Crore	Reduction in land area (216.534-171)	= 45.534	Cost of land per Hect.	= 5.66 Crore	Total Saving (5.66 Cr x 45.534)	= 257.72 Crore	Reduction in length of tunnel/cut & cover (6.174-1.56)	= 4.614 Km.	Cost of Tunnel per Km.	=27.60 Crore	Total saving (4.614x27.60)	=127.35 Crore	Gross saving (1+2+3)	= Rs.457.06 Crore
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<p>3.</p>	<p>REVIEW OF REQUIREMENT OF ROB AND REPLACING THEM BY RUB:</p> <p>3.1 ROHTAK-MEHAM-HANSI NEW LINE: In the detailed estimate, there was a provision of 5 ROBs on the State Highway. The requirement of these ROBs have been reviewed and it has been observed that at four locations, RUBs can be provided in place of ROBs by providing the ruling gradient of 1 in 200 in place of 1 in 250. The ruling gradient of existing lines in nearby area is also 1 in 200. In addition, due to less proposed traffic density and being a branch line, the thickness of the blanketing has been reduced from 60 cm to 30 cm. With the above changes, the total estimated cost of the work has been reduced by Rs. 177.16 crore.</p>																				

	<p>3.2 Amb Andaura-Daulat Pur section: There are 8 ROBs in Amb Andaura-Daulat Pur section. These ROBs are in cutting and were planned with 36 spans of 24.4m length. The detailed review of the work has been done and now 6 out of 8 ROBs have been planned with Road under Bridges. In addition, the provision of one metre thick layer of river bed material (blanketing) has been replaced with the already available SQ-3 type of soil.</p> <p>With these innovations, there is a total saving of Rs. 12.5 crores.</p>
4.	<p>SYSTEM IMPROVEMENT BY ISSUING STANDARD TENDER SCHEDULE FOR ROBS/RUBS, EARTHWORK, MAJOR BRIDGES, P.WAY:</p> <p>Standardization generates standards which are essential components of infrastructure of any organization. Northern Railway Construction Organization has standardized tender schedule for ROB/RUBs which is a system improvement to curtail the time in performing various technical/ financial checks on tender documents. Earlier field units used to prepare the tender schedule on the basis of prevailing system in the respective units resulting into different items of tender schedules of different units. Now a uniform system of preparing tender document on all field units has been developed by standardization of tender schedule. A remarkable saving of approximate Rs. 60.00 crores has been brought out by preparing and sanctioning detailed estimates on the basis of standard tender schedule for LHS (74 Nos.). Hence, standardization has not only resulted in economy but also avoiding delay in technical check/vetting of tender schedule.</p>
5.	<p>OTHER MAJOR ISSUES TO BE TAKEN CARE OF IN NL AND DL PROJECTS(IN BULLET POINTS ONLY, DUE TO SPACE CONSTRAINTS):</p> <p>5.1 DETAILED TECHNICAL SURVEY INCLUDING SOIL SURVEY AND UTILITY SHIFTING REQUIREMENTS</p> <p>5.2 P-WAY MATERIAL: PLANNING, PROCUREMENT AND ITS TRANSPORTATION</p> <p>5.3 YARD REMODELLING: PLANNING, PREPARATION AND APPROVAL OF ESP / SIP</p> <p>5.4 TRACK MACHINES AND WELDING: REQUIREMENT ASSESSMENT AND THEIR DEPLOYMENT</p> <p>5.5 SPEED RESTRICTIONS / BLOCKS MANAGEMENT AND REQUIREMENT OF OTHER DEPARTMENTS LIKE ELECTRICAL, S&T AND OPERATING</p> <p>5.6 REGULAR COORDINATION WITH ELECTRICAL AND S&T TEAM OF CONSTRUCTION AT ALL LEVEL INCLUDING OPEN LINE UNITS</p> <p>5.7 REGULAR REVIEW MEETINGS AT CE/C AND CAO/C LEVEL TO PUSH THE OUTPUT</p> <p>5.8 CONTRACT ZONING AND MANAGEMENT</p> <p>5.9 HUMAN RESOURCE MANAGEMENT COMMENSURATE TO</p>

	VARIABLE REQUIREMENTS
	5.10 EFFICIENT MONITORING MECHANISM
	5.11 COMMISSIONING OF SECTION: CRS INSPECTION OF MANSA KOTFATEH SECTION TO COMMISSION AT 110KMPH (MAXIMUM PERMISSIBLE SPEED) AND COMMENT BY CRS ABOUT TRACK AS "OUTSTANDING"

CONCLUSION:-

The project planning, execution, monitoring and commissioning in Railways is not only gaining importance due to sudden increase in funds provisions to support and expand Railway infrastructure, but also has surprised all stake holders to deliver higher outputs, which was not so demanding earlier.

Northern Railway Organization has delivered on all three basic requirements of the subject of this paper; Faster Construction, Quality Construction and Economic Construction.

Northern Railway Construction Organization has commissioned **188 KMs** in first nine months of a year, which is a record at NR level as well as best performance among all Railways and the same represents **Faster Construction**.

Quality construction is paramount and being insisted upon tirelessly. In one of the inspection of Doubling CRS commented about track as "Outstanding" and accordingly opened the section at 110 KMPH (i.e. Maximum permissible speed), which is a record in itself and may be representation of efforts towards **Quality Construction**.

Economic Construction has been the pressing initiative of NR Construction and efforts have saved in Crores, which have been well appreciated and an award of Rs 10 lakh have been announced by Hon'ble MR to NR Construction for further improvements by innovative measures.