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FEASIBILITY STUDY ON RAILWAY ALIGNMENT OF NTPC KHARGONE POWER PLANT

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ABSTRACT

From a time being in every part of developing as well developed nation Railways transportation plays one of the leading roles in the growth and in an enhancement of Socio –Economic status of the capita. At present, Indian Railways (IR) is the biggest public undertaking of the Government of India, having a capital-at-charge of about Rs.560, 000 millions. In Indian Railways especially, the track structure has been changed drastically in the last decades**.** Diverse challenges are encountered during fixation of alignment for new feasible route from the standpoint of benefits of users and economy together with the socio-economical and environmental impacts are all taken into deliberations. These factors with several design constraints make the jobs to be very hard and so, the railway alignment designs to be very time consuming process. Alignment design usually consists of a series of phases starting from a broad area, then growing down to several suitable and possible transportation corridors, and finally focusing on the detailed alignment design in the selected corridor. So as to cope up with the challenge encountered during the selection of feasible alignment amount the available alternates need to be pay a special attention and as no such standard methodology is available, it become tedious job to chalk out the most feasible track.

Key words —Feasibility study, Railway alignment, Route selection.

I. INTRODUCTION

Railway Engineering is the branch of Transportation Engineering which involves planning, design, construction, operation and maintenance of railway land facilities used for the movement of people and goods serving the social and economic needs of the society. In order to lay a new railway line, it becomes necessary to carry out survey for proper alignment fixation. A new railway line needs to be aligned carefully after proper considerations, as improper alignment may ultimately prove to be more costly and may not be able to fulfill desirable objectives. Basically; alignment fixation is the railway location problem where a route between two points must be constructed. There can be several options to decide the feasible alignment of the railway track which depends upon overall construction cost, operational and maintenance criteria, environmental concerns, politics, land use issues, economics, long term traffic levels and the size and scope of the project. NTPC Ltd is in the process of setting up of a 2x 660 MW Power plant in the vicinity of Selda village in Khargone district of

Madhya Pradesh in the name of "Khargone Thermal Power Plant Project". The main commodity coal is required for generation of power. As per NTPC the coal requirement is assumed to be 6.6 MTPA and per day requirement is approximately 20,000 MT. Considering 330 working days in a year is equivalent to 5 rakes per day and one furnace oil rake per month so one single broad gauge track with two crossing station & a "Y" Connection takeoff station is sufficient as per requirement. For identification of the most feasible alignment connecting the proposed thermal power plant, the feasibility study is done. The feasibility study will have a detailed analysis of built environment, engineering requirements, and the demands of usage of the line for coal transportation, economic and financial modeling, land use and environmental planning issues. Rail connectivity is essential for transportation of coal up to the proposed plant.

II. METHODOLOGY

The aim behind carrying out this analysis is to arrive at the best value for a set of various proposals. Risk is analyzed in many ways, such as technological maturity, quality standards, design, material and supply chain capacity, cost reasonableness, among many others. Examination of a number of alternative alignments from Omkarashwar station, Sanawad Statiion,NimerKheri and Kothla Kheri has been carried out through initial desktop study with the help of topo-sheet of Survey of India. Procedure involved in this study is as follows:-

III. EXPERIMENTAL APPROACH

There are four stations from which a private railway siding can take off to the proposed power plant. These are :

(i) Omkareshwar Road station at km 572.5 (ROUTE-01)
(ii) Sanawad station at km 577.94 (ROUTE-02)
(iii) Nimar Kheri station at km 589.22 (ROUTE-03)
(iv) Kotla Kheri station at km 594.00 (ROUTE-04)

} All reckoned from Ajmer Junction.

The first three stations are 'B' class stations provided with 2 loops and have lower quadrant, Home, and Starter signals. The signals are illuminated by Photo Voltaic cells (PV cells). Kotla Kheri station is only a flag or Halt station operated by contractor. Presently there is no loop at the station.

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IV. COMPARISON OF ROUTES

The final comparison of routes has been done on the parameters such as route length, total bridges to be constructed in each route, the land to be acquired for the construction purpose, and the total cost of each alignment. The detailed analysis is described below:-

ROUTE-01:-This is a 3-line 'B' class station. The station is due for B.G. conversion and the length of loops etc. will change along with conversion. National Highway No. 51 between Indore- Khandwa runs, along the station. The boundary wall on the north of the station is the dividing line between NH and the station. The area adjacent to the road is heavily built up and there is heavy ribbon development on the right side.

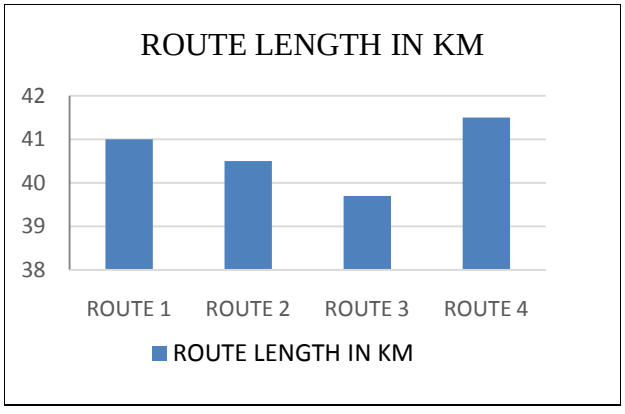
ROUTE-02:- A 'B' class interlocked station with three loops. On the west, the area is heavily built up and will necessitate demolition of several private buildings in addition to entry into a reserved forest (RF) will become unavoidable. Near the Home signal there is a huge weekly cattle market.

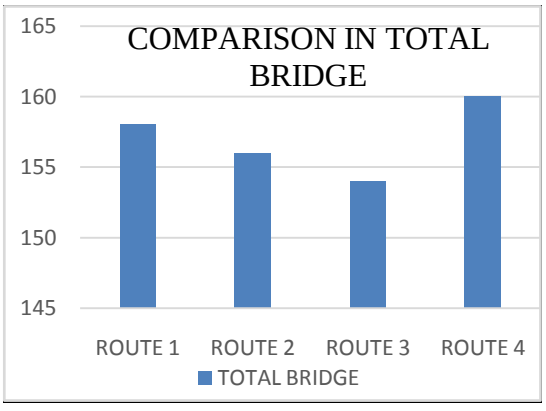
To avoid all these features, the siding will have to be taken parallel to railway line on the south for about 4-6 kms and then deflect south. By the time the siding starts deflecting south, it would have nearly entered the territory of Omkareshwar station. It has also to skirt a small hilly feature.

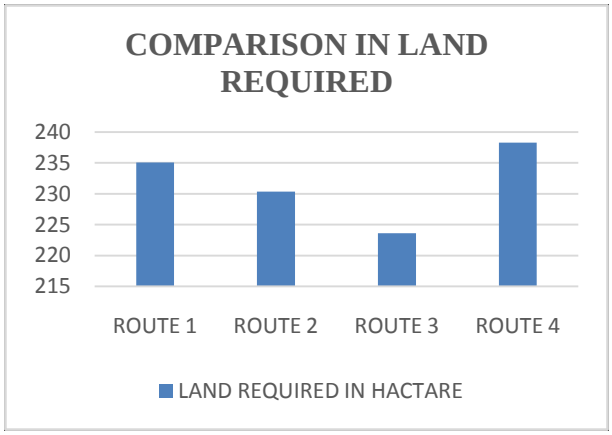
ROUTE-03:- This is also a 'B' class 3-line station. There is adequate space both on the north and south to provide for one loop each on both side in addition to two loops and the main line.

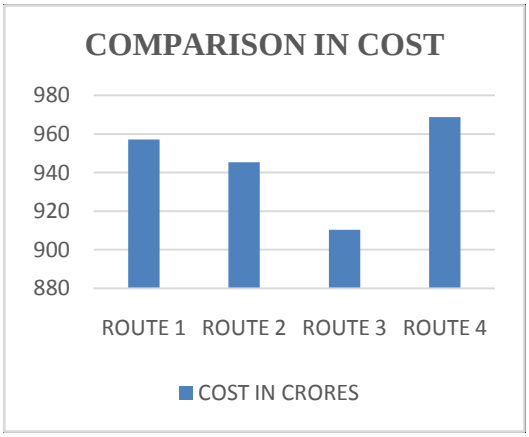
Since mostly agricultural land will be involved and there were no visible signs of any forests along the alignment. Selecting Nimarkheri station apart from the comparative case with which the siding can be taken off, the comparatively fewer number of built-up structures that may have to be acquired.

ROUTE-04:- This is also a 'B' class 3-line station. There is adequate space both on the north and south to provide for one loop each on both side in addition to two loops and the main line. Since NTPC's action zone is on the south there should be no problem in laying an additional loop by reducing the width of the rail level platform. The countryside to be traversed by the siding is fairly plain and mostly agricultural / cultivated. Since mostly agricultural land will be involved and there were no visible signs of any forests along the alignment. Selecting Nimarkheri station apart from the comparative case with which the siding can be taken off, the comparatively fewer number of built-up structures that may have to be acquired.









The bar chart representation shows that Route No.03 is more feasible. Route 01 and Route 02 are not chosen as take off from this station is fraught with many problems. Thus only Route-03 and Route-04 are chosen for further selection of feasible route. Details are tabulated below:-

		STATION			
PARAMETERS	**UNITS**	**ROUTE 1 FROM OMKARESHWAR ROAD STATION**	**ROUTE 2 FROM SANAWAD STATION**	**ROUTE 3 FROM NIMARKHERI STATION**	**ROUTE 4 FROM KOTLAKHERI STATION**
		A	**B**	**C**	**D**
ROUTE LENGTH UPTO NTPC PLANT ENTRY	**ROUTE KM**	38.5	38	37.2	39
ROUTE LENGTH INSIDE PLANT OF NTPC	**ROUTE KM**	2.5	2.5	2.5	2.5
TOTAL ROUTE LENGTH	**ROUTE KM**	41	40.5	39.7	41.5
TOTAL BRIDGES	**NOS.**	158	156	154	160
COST	**CRORES**	957.05	945.37	910.36	968.716
LAND REQUIRED	**HECTARE**	235.057	230.067	223.591	238.295
TACKOFF FACILITY		NOT FEASIBLE	NOT FEASIBLE	**FEASIBLE**	**FEASIBLE**
STATION TYPE		"B" CLASS STATION			HALT STATION

V. FEASIBLE ROUTE SELECTION

Examination of the four alternatives has thrown up a scenario in which two possible alternatives stand out in comparison to others; both are viable and feasible But, the siding from Kotla Kheri will be longer by approximately 2.5m. Besides this, adequate land is not available at Kotla Kheri, which is just around 20.0m in

total inadequate to provide all the facilities and as such land may have to be acquired on both sides of the station. Another negative point is that a level crossing is just 250.0m from centre of station building. Though this station initially looked promising, subsequently lost out on various counts, such as non-availability of land, presence of level crossing and the probability of creating a station at NTPC's cost. In view of above, Kotla Kheri goes out of the zone of consideration. This brings only Nimerkhari as the most preferred option from all accounts. Thus,Nimerkheri station is selected as most feasible station with total route length of 39.7 km.

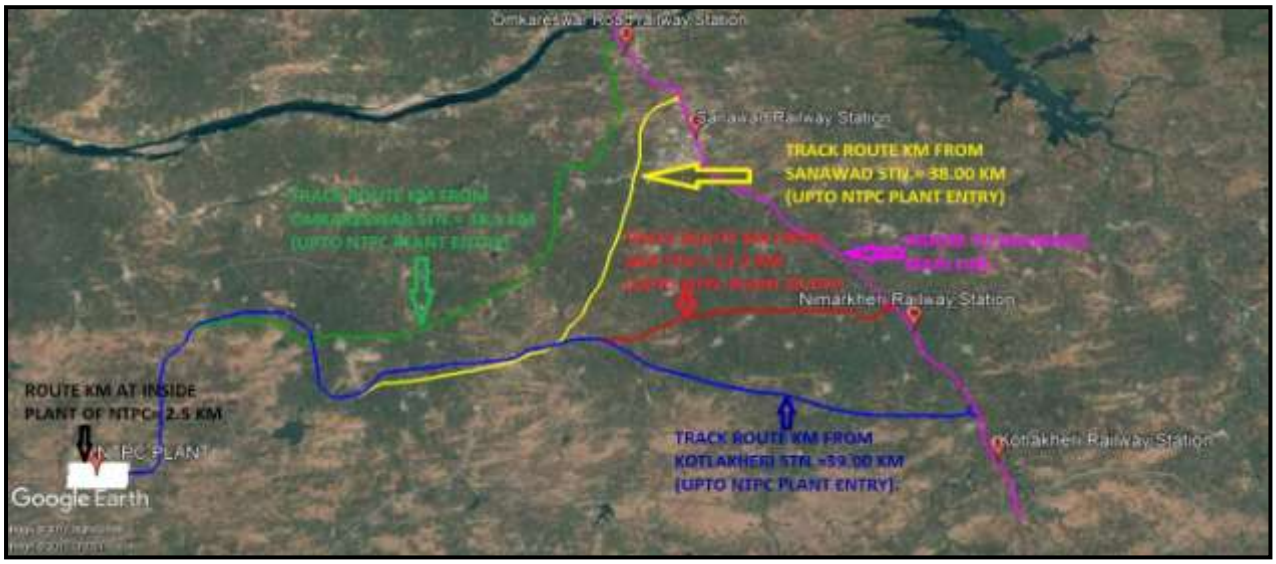


Fig.1: Compiled representation for alternate routes

VI. CONCLUSION

In India feasibility study for railway projects have been developed on an ad-hoc basis because a standardized approach has never really been developed. This may result in quiet high risk of failure when the projects either runs very late or is widely over budget Feasibility study of four routes has been carried out of which most feasible route has been selected on the parameters such as total route length of track, total bridges, land required, take off facility, overall estimated cost of the project etc.When the different parameters for selection of feasible route were compared, it was observed that civil construction has the maximum weightage in enhancing the cost of the project. While carrying out the detailed study of the most feasible alignment, the data collected using DGPS survey were plotted in AUTOCAD to determine the centre-line ordinate of the alignment which is used during construction of railway line at site.

DGPS survey itself is not at all sufficient to plot the alignment route. It requires thorough study of site and software so that alternatives required joining the alignment such as curves and y-connections can be positioned correctly

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