Study Committee B2

Overhead Lines

10449_2022

Design Innovations for Mitigating Construction Challenges of Overhead Lines

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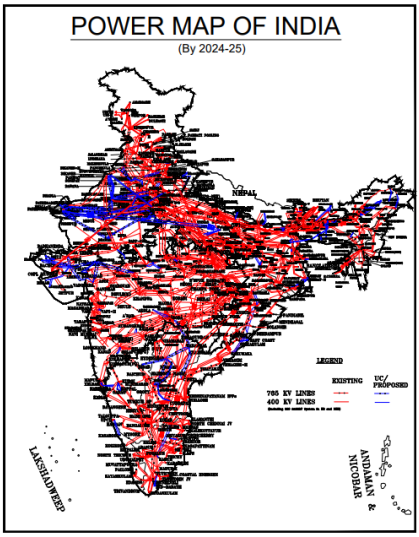
INTRODUCTION



- Such phenomenal growth always encountered with several constructional challenges.
- Route of transmission lines traverse through several river crossings and congested areas with severe space constraints.

- The paper describes some of the efforts to address the various constructional challenges and highlights necessary design considerations for implementing new engineering solutions through example cases

A. ROCK ANCHOR FOUNDATION IN MID-STREAM OF A LARGE RIVER

For Commissioning of ± 800 KV HVDC line, works was balance for one river crossing location which was having 10 m deep standing water on hard rock river bed and there was very remote possibility of water receding in near future. Various option were explored and a novel solution of casting hard rock anchor foundation in mid stream was executed mitigating all the challenges.

B. INTERSECTION TOWER (SPECIAL MULTI-CIRCUIT TOWER and TWO TIER GANTRY

There were two existing 400 kV D/C transmission lines at 400/220 kV Kota sub-station in addition to few more lines A 220 kV D/C KTPS-Kota line of other utility was over-crossing both the 400 kV existing lines very close to the boundary wall of sub-station and a tower was placed in between the existing lines. This tower was blocking the take-off of the new line at Kota S/S. A new 400 kV D/C line was to be terminated at the sub-station and there was no any space left for this termination.

A new engineering solution for addressing the challenge of space constraint was introduced to provide a multi-circuit tower with two circuits perpendicular to other 2 circuits in the alignment of our new line and close to the existing tower which was blocking corridor of the new line.

Similarly at one substation , to accommodate various lines in a space crunch substation , an innovative solution of using two tier gantry was executed.

C.OBTUSE ANGLE TOWER

To mitigate the severe ROW issue a new tower was designed with two cross arms at 90 degree at same level to rotate the line by approx. 119 degree .

CONCLUSION

Such unique approaches in construction of new transmission lines have been immensely useful to mitigate the adverse environment impact, saving cost, meet completion schedule, reduce outage duration & optimizing the Right of way requirements.

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A. ROCK ANCHOR FOUNDATION IN MID-STREAM OF A LARGE RIVER

CHALLENGES

The locations were falling under Srisailem Dam Reservoir area.

INITIAL SOLUTIONS AND CHALLENGES

- Provide ERS Towers and Simultaneous completion of regular pile foundation
- Very High ERS towers were required for approx. 1000 m of crossing.
- Land around proposed area was marshy and putting anchor in those area was risky considering heavy rains.

- Simultaneous boring in mid stream also started and due to very hard rock strata , boring process was very slow.
- After some time , national lockdown was imposed due to COVID 19 and all works stopped. However after some time some relaxation was given for infrastructure projects.
- By that time it became evident that conventional pile foundation after boring through hard rock strata shall not be possible, alternatives were explored

ALTERNATIVE SOLUTIONS

Option-I: Instead of single pile foundation in the midstream, provision of two open cast rock anchor foundations near both banks of the river. However founding strata was not good enough to cast open foundation

Option-II: As time was running, rock anchor foundation for the midstream location having hard rock strata however standing height of water is 5-6 m . This was thought of a viable option in a given scenario.

Characteristic Data of The River

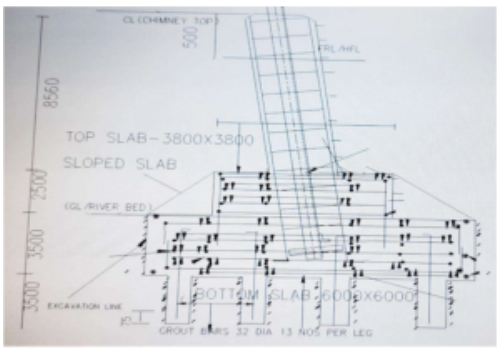
- Velocity of water in the river considered as 2.68 m/s. and discharge as 14866 Cusecs
- 10.75 M level difference between HFL and River bed.

Design Methodology

The foundation has been designed for following resistance:

Loads (in MT): - The following loads have been considered

Compression	Uplift	Side Thrust (Trans)	Side Thrust (Long.)
317	249	23	12



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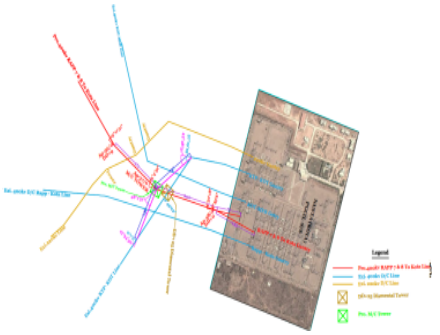
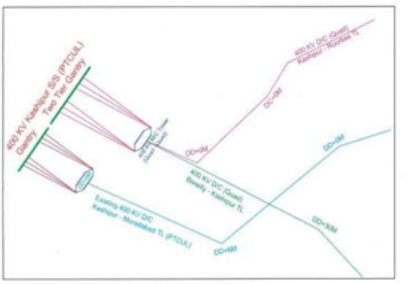
B. INTERSECTION TOWER (SPECIAL MULTI-CIRCUIT TOWER)



D. TWO-TIER GANTRY



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