

Preliminary Site Inspection Report of Tower location nos. 282, 286 & 290 of 400 kV D/C Twin Moose Sambha – Amargarh Transmission Line of NRSS XXIX Transmission Limited ('NTL') in Rajouri district of Jammu on 17.11.2021

1. Background

NTL vide email dated 26.10.2021 intimated regarding damage to the revetment of the foundation of location no. 286 of 400kV D/C Twin Moose Sambha-Amargarh Transmission line due to road widening work by Border Road Organization (BRO). It was highlighted by NTL that other tower locations (Location no. 282 and 290) are also critical as these tower locations are very near to the road for which BRO is planning to widen the road. In this regard a meeting was held on 2.11.2021 through video conferencing to discuss the matter. In the meeting it was decided that a joint survey will be conducted by M/s. NTL and BRO at these critical tower locations along with the representatives from CEA and survey report will be submitted to CEA. In response to this, a team of officers from CEA participated in the joint survey conducted by NTL and BRO of the above mentioned transmission line on 17.11.2021 for finding solutions to mitigate further damage to the tower at location no. 286 and measures to protect the transmission towers during the road widening work.

Following officials from CEA visited the site:

1. Shri Bhanwar Singh Meena, Deputy Director, PSE&TD Division
2. Shri Deepak Singh Raghuvanshi, Deputy Director, TCD Division
3. Shri Apoorv Goyal, Assistant Director, PSE&TD Division

2. Observations

BRO is expanding the road from Bufihaz to Rajouri in Jammu region of UT of Jammu & Kashmir, which runs parallel to the 400kV D/C Twin Moose Sambha-Amargarh Transmission line & very close to the tower location nos. 282, 286 & 290. The above road was built in the 1960s and widening of this road is essential for movement of the defence forces and local people. The 400kV D/C Twin Moose Sambha-Amargarh Transmission line was commissioned in September 2018. This line is a part of Northern Region Strengthening Scheme and critical for power supply to the Union Territory of Jammu & Kashmir. Total length of transmission line is 546.6 Km and consist of a total number of 761 transmission towers, out of which 590 are Tension towers and 171 are Suspension Towers. Tower location wise observations are as follows:

2.1 Tower location no. 282

The tower is located near the river with very few trees in the vicinity (as shown in Fig. 1 & 1.a). There is no damage to the tower till now. All stubs and chimney were intact. Some excavation work has been done near the tower by the BRO. Since the slope at which the tower is located is not too steep, the tower foundation is at less risk to get damaged. However, since tower is very near to the road side, any further excavation may lead to exposure of its foundation and hence retaining wall, if required, may be provided to avoid soil erosion.

Soil condition	Alluvial soil
Conductor configuration	Twin Moose
Insulator configuration	Tension



Figure.1



Figure 1.a



Figure 2

2.2 Tower location no. 286

The tower is located in the upper side of the road about 20-25 feet away from outer side of the present road with very few trees in the vicinity (as shown in Fig. 3). The distance of tower from the RoW of the road, once it is widened, will become about 10 feet. The tower is located on the hilly slope (Fig 4, 5) which is very unstable and there is risk of soil erosion. Cracks have developed on the retaining wall and nearby house also. Prima facie on visiting the tower location it appears that the soil mass is unstable which has potential of sliding the tower foundation. Therefore, this location needs construction of retaining wall at the location of the soil cut. Further, at this location, in the surrounding soil, severe cracks have also developed. Any ingress of water through these cracks will further worsen the problem of sliding of soil mass. The treatment of these cracks seems to be of importance and needs to be taken care diligently. Geotechnical investigation to the hill strata is required to formulate the mitigation measures to protect the tower during road widening work.

Soil condition	Alluvial soil
Conductor configuration	Twin Moose
Insulator configuration	Tension



Fig 3



Fig 4



Fig 5

The excavation work was done in the downward side of the tower by the BRO for widening the road. (Fig 6-10)

Figure 11-14 shows cracks on the mountain slope. It was observed that leg C of the tower had bent just above the stub and all the other legs were found to be normal.



Fig 6



Fig 7



Fig 8



Fig 9



Fig 10



Fig
11
Fig
12



Fig 13



Fig 14



Fig 15: Leg A



Fig 16: Leg D



Fig 17: Leg B



Fig 18: Leg C

NTL have provided a temporary back stay to the tower to stop further buckling of the tower (Fig 19). Further, additional anchoring provisions (Fig 20) were kept at various critical points of hill slope and RCC reinforcement proposed for the breast wall. Also, stone pitching work is carried out around the tower to stop the soil erosion (Fig 21-23).

BRO has constructed a Plumb wall near the downhill section of Location no. 286 and has stopped the excavation work near the site.

It has been seen that there are many cracks on the slope of the hill near the tower location. There has been crack on the wall and floor of the house located above the transmission tower. (Figure 24-26)



Fig 19



Fig 20

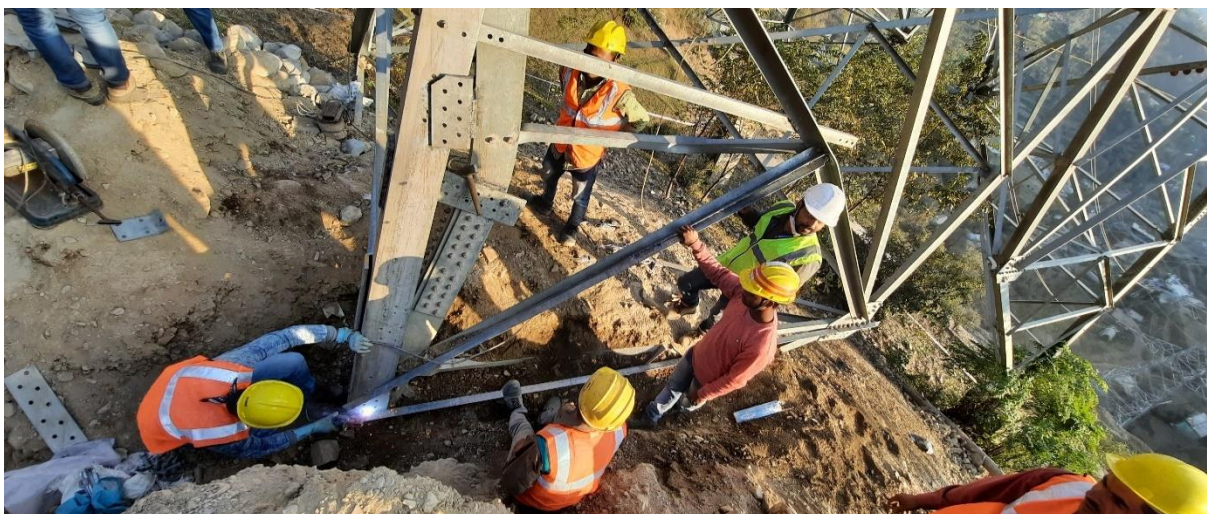


Fig 21



Fig 22



Fig 23



Fig 24



Fig 25



Fig 26

2.3 Tower location no. 290

The tower is located on a steep hilly slope and very near to the road as shown in figure 27 and 28. It has been noticed that BRO has not started excavation work for widening of the road near this tower location. The tower is at high risk of collapsing when the excavation work will start. It is falling in the RoW of the proposed widened road. Proper steps are required to protect the hill slope before starting the excavation work.

Soil condition	Alluvial soil
Conductor configuration	Twin Moose
Insulator configuration	Tension

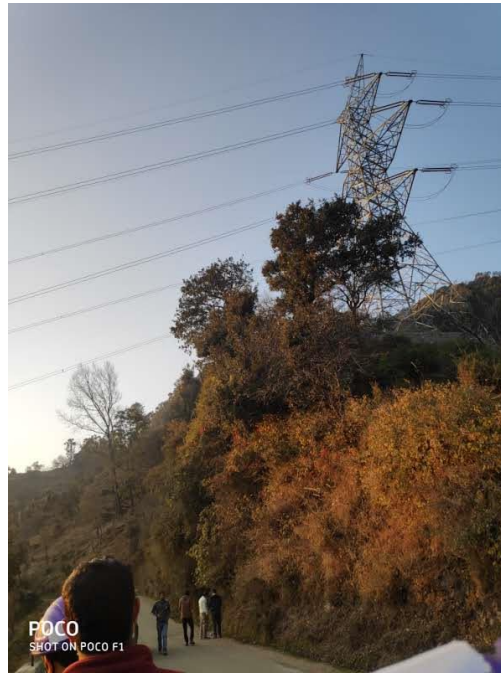


Fig 27



Fig 28

Conclusions:

1. At Tower location no. 286, excavation work has been done by BRO upto about 20-25 feet from tower. There are many cracks on the slope of the hill near the tower location. Any ingress of water through these cracks will further worsen the problem of sliding of

soil mass. The treatment of these cracks seems to be of importance and needs to be taken care diligently.

2. At this location, ridge on which transmission tower is located is unstable. Geotechnical investigation of the hill strata is required to provide suitable solution to avoid possible sliding of major land mass along with tower. This location needs construction of retaining wall at the location of the soil cut.
3. NTL and BRO jointly required to take suitable measures at the earliest to avoid further possible damages on the critical location no. 286.
4. At Tower location 282, some excavation work has been done, there is no damage to the tower. However, since tower is very near to the road side, any further excavation may lead to exposure of its foundation and hence retaining wall, if required, may be provided to avoid soil erosion.
5. At Tower Location 290, BRO has not started the construction of the road. The tower is very near to road and is located at a height. There is threat of tower collapsing if the excavation work is done near to subject tower location.
6. Joint action plan shall be prepared by the NTL and BRO as soon as possible and suitable measures shall be ensured before widening of the road to avoid damages to transmission towers.