TRANSMISSION ENGINEERING · STEP 02 · ROUTE & SITE ENGINEERING · REPORT

Geotechnical Investigation Report

Soil classification, bearing capacity and foundation recommendation for representative tower locations and the substation site.

Worked example (anonymised): 132 kV D/C Transmission Line & Switching Station · 50 MWac solar park evacuation, single circuit initially, D/C ready · Maharashtra, Western India. 18 km greenfield 132 kV line connecting a solar park pooling substation to the nearest DISCOM switching station, routed through mixed agricultural land and a short forest patch requiring diversion approval.

Illustrative sample image

Sample excerpt · Trial Pit Summary - Substation Site & Sample Towers

Location	Depth Investigated (m)	SPT N-Value	Soil Type	Bearing Capacity (t/m²)	Water Table (m)	Foundation Type Suggested
Substation Site	6.0	22-28	Silty sand	18	4.2	Raft/isolated footing
T-10	3.0	12-16	Clayey silt	12	3.5	Under-reamed pile
T-16	3.0	6-9	Soft clay	8	2.1	Pile foundation
T-25	3.0	30+	Weathered rock	35	6.0+	Open footing

Notes

• Soft clay stretch (T-15 to T-17) flagged for pile foundation cost premium in BoQ
• Substation site confirmed suitable for raft foundation without major ground improvement

What happens in this step

1. Desktop corridor screening using satellite imagery, forest/eco-sensitive zone maps and existing RoW data to shortlist 2-3 viable alignments
2. LiDAR/DGPS or drone-based topographic survey along the shortlisted corridor to build a 3D terrain and vegetation model

3. Tower spotting and profile plotting on the surveyed terrain to optimise span lengths, angle points and tower type selection
4. Geotechnical investigation (trial pits/boreholes) at representative tower locations and the substation site to classify soil bearing capacity
5. Substation site selection and comparison across candidate plots on land availability, flood/seismic risk, access road distance and grid-tie feasibility
6. Stakeholder and statutory mapping - private land parcels, forest patches, water bodies, protected structures - with a preliminary crossing schedule
7. Consolidated route alignment drawing, tower schedule and site selection memo issued for client sign-off before detailed design

Outcomes

• Land acquisition and forest clearance risks identified and quantified before detailed design commitment
• Optimised tower count and span design reducing overall line cost by minimising unnecessary angle points
• Geotechnically validated foundation strategy avoiding costly design changes during construction
• Substation site selection backed by a defensible, criteria-based comparison for internal and lender approval

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