

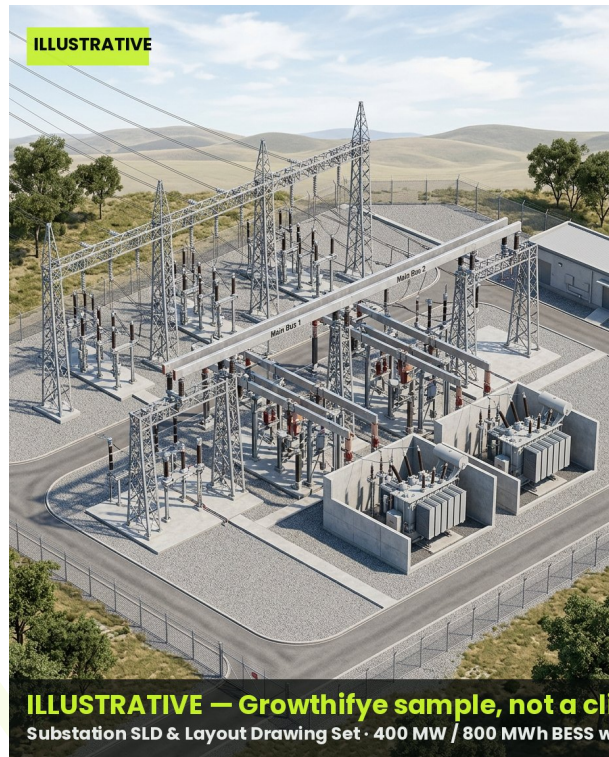


TRANSMISSION ENGINEERING · STEP 03 · DETAILED DESIGN · DRAWING

Substation SLD & Layout Drawing Set

Approved-for-construction single line diagrams, bay layouts, sectional views and equipment schedules for the 220 kV pooling substation.

Worked example (anonymised): Standalone BESS Interconnection Package · 400 MW / 800 MWh BESS with 220 kV pooling substation · Western India. Detailed design of a 220 kV pooling substation, associated P&C; schemes and a 12 km double-circuit line package connecting the BESS to the state transmission utility's grid substation.



Illustrative sample image

Sample excerpt · Bay Schedule Extract

Bay No.	Voltage	Bay Type	Equipment	Rating	Status
B1	220 kV	Line Bay	CB, CT, CVT, Isolators	220 kV, 40 kA	Issued for Construction
B2	220 kV	Transformer Bay	CB, CT, Isolators	220 kV, 40 kA	Issued for Construction
B3	220 kV	Bus Coupler	CB, CT	220 kV, 40 kA	Issued for Construction
B4	33 kV	BESS Feeder Bay	CB, CT, VT	33 kV, 25 kA	Under Review
B5	220 kV	Spare Line Bay	CB, CT, CVT	220 kV, 40 kA	Design Complete

Notes

- Layouts follow CEA clearance and CBIP manual norms for 220 kV class
- Future 2-bay extension provisioned in the GA drawing

What happens in this step

1. Finalise single line diagrams (SLDs), bus arrangements and bay layouts based on approved load flow, short circuit and stability study outputs



2. Prepare substation general arrangement (GA), sectional and equipment layout drawings including clearances as per CEA/CBIP guidelines
3. Develop protection & control philosophy, relay coordination studies, and P&C; schematics for line, transformer and bus protection
4. Design SCADA/RTU architecture, communication network topology (OPGW/fibre), and interface points with the utility's control centre
5. Prepare transmission line design package: tower spotting, sag-tension calculations, foundation type selection and conductor/OPGW schedules
6. Cross-discipline clash check and constructability review across civil, electrical and protection drawings
7. Issue design packages for internal design review, statutory vetting, and procurement-ready issuance

Outcomes

- Construction-ready substation and line drawings accepted by the utility with minimal revision cycles
- Protection coordination validated against the utility's existing relay settings, avoiding nuisance tripping
- SCADA architecture pre-aligned with the load dispatch centre's interface standards, reducing commissioning delays
- Single integrated design package enabling faster, cleaner EPC tendering and vendor bid comparison

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