

CASE STUDIES · CREDENTIALS

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# SUBSTATION & TRANSMISSION

Power Plant · Transmission and Distribution · Oil & Gas · Water Treatment · Special Purpose Machines

**ENGINEERING  
DESIGN**

# High-Altitude Substation Design for **World's Largest Enhanced Geothermal Station**

500 MW Enhanced Geothermal Station — High-Altitude Substation & Transmission

## SCOPE

Detail Engineering Services — Electrical and Civil & Structural for World's Largest Enhanced Geothermal Station (500 MW), including GSU Stations, Transmission Line, and Collector Substation Upgrade.

## ELECTRICAL

- i. 3 × 13.8/69 kV, 54 MVA GSU stations and three 69 kV distribution lines
- ii. 69/362 kV substation with 204 MVA transformer and 6.09-mile 362 kV transmission line
- iii. Upgrade of existing 362 kV collector substation — SLD, protection, and SCADA

## CIVIL & STRUCTURAL

- i. Layout, plot plan, and foundation drawings for substation structures
- ii. FEA-based structural analysis of rigid bus systems under wind, snow, ice, seismic, and magnetic loads (RISA/STAAD/SAP2000)
- iii. Overhead support and dead-end structure design; steel detailing and fabrication drawings

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## WHAT WE DID DIFFERENTLY

### CHALLENGES

- High altitude (5200 ft) demanded equipment derating and enhanced insulation clearances for reduced air density
- N-1 reliability over a 6.09-mile 362 kV line with significant voltage drop and line loss exposure
- Aggressive COD (100 MW by 2026, 500 MW by 2028) required Phase-II-ready infrastructure from day one
- Combined wind, ice, seismic, and magnetic loads on elevated rigid bus and support structures

### SOLUTIONS

- Altitude treated as a primary design input — equipment derated and insulation optimised upfront per IEEE/IEC
- N-1 redundant protection and SCADA with remote monitoring, eliminating single-contingency outage risk
- Spare-bay, capacity-reserved design from day one — Phase-II 500 MW steps onto already-engineered infrastructure
- Full FEA of rigid bus systems with verified Steel-to-Aluminium and Aluminium-to-Aluminium connection detailing

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# Let's engineer your next project together.

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*Breaking Barriers in Engineering Design*

Multidisciplinary Detail Design · EPC & OEM Support

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