

Electrical Engineering

Industry relies on electric power and control systems to operate and monitor processes that function within defined environmental and economic considerations. The electrical engineers at GAI Consultants help clients meet this critical need with safe and reliable electric power and control systems. Our innovative solutions for electrical systems and components benefit energy and industrial facilities—from food processing and manufacturing to power generation plants.

The combined approach of engineers, environmental specialists, and health & safety professionals means customized solutions that fit each unique challenge.

Developing control systems starts with system mapping and a detailed summary of operations. Turnkey power systems require precise substation sizing, detailed designs, and specialized equipment and structural components. GAI's services include equipment testing and validation, system testing

and start-up, contractor selection, and O&M training for employees. Our job is not complete until start-up is successful and controls are fine-tuned.

GAI's substation and power plant services cover 5kV-138kV primary and 120V-15kV secondary voltage, and facility sizes ranging from 500kVA-50MVA. Our skilled electrical engineers address harmonic and power quality problems and conduct studies to evaluate equipment ratings, protective device coordination, system loading, and arc flash incident energy and flash protection boundaries.

GAI uses sophisticated software to conduct arc flash hazard studies. We quantify arc flash hazard information for plant workers to use when evaluating how to approach work tasks involving energized electrical equipment. These arc flash studies often reveal preventive maintenance or equipment upgrades needed to help avoid catastrophic damage to electrical equipment caused by arcing between energized conductors. GAI also provides safety training and helps clients determine the level of Personal Protection



gai consultants®

Service Profile



Equipment (PPE) required for their maintenance staff. We address NFPA 70E and OSHA compliance and allowable approach distances for non-qualified personnel.

GAI's lighting system designs cover interior building systems, entire facilities, and highways. We follow standard illumination guidelines and use innovative concepts based on legacy/cutting edge technology. GAI also specializes in audio and visual system design, and provides design and analysis for security systems.

Focusing on reliability and sustainability, GAI conducts QA/QC, insulation coordination, harmonic analysis, and energy conservation studies. Our professionals evaluate power quality, and analyze power distribution system reliability and availability.

GAI combines the years of experience, project knowledge, and sector-specific familiarity of our electrical engineers with mechanical, structural, geotechnical, and environmental engineering to bring clients comprehensive cost-effective solutions.

Electrical Engineering Services

- AC/DC substation design, layout, specifications
- AC/DC power distribution system (PDS) design
- Motor control system design and specifications
- Traction power substation (TPSS) design
- AC/DC substation, PDS, and TPSS construction
- Lightning system and surge protection design
- Emergency backup power and protection systems
- Building and facilities security and access systems
- Program and construction management
- Control system design and construction
- Energy storage systems engineering and design
- Electrical testing/preventative maintenance
- System integration and procurement services
- Ground grid design/smart and micro-grid solutions
- Building information system coordination
- Copper, fiber, wireless voice data and networking
- Short circuit analysis/equipment rating evaluation
- Arc flash hazard analysis, labeling, training
- Electric load flow analysis/motor starting studies
- Power factor analysis/corrective mitigation design
- Switching transient analysis

GAI Services Summary

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| ■ Airport Planning and Design | ■ Impoundment and Landfill Permitting and Design |
| ■ Bridge and Structure Inspection and Design | ■ Land Development Engineering |
| ■ Coal Combustion Residuals Management | ■ Landscape Architecture and Design |
| ■ Construction Inspection and Management | ■ Master Planning and Urban Design |
| ■ Cultural Resources Management | ■ Mechanical, Electrical, Structural Engineering |
| ■ Economic Analyses and Strategies | ■ Natural Gas FERC Certification and Permitting |
| ■ Electric Transmission Design and Siting | ■ Nuclear Energy Engineering Support |
| ■ Environmental Engineering | ■ Right of Way and Appraisal Support |
| ■ Environmental Studies, Species Studies, Permitting | ■ Land Surveying and Mapping |
| ■ Gas Pipeline Surveying and Mapping | ■ Transportation Planning and Design |
| ■ Geographic Information Systems (GIS) | ■ Utility Management Consulting |
| ■ Geotechnical Engineering and Geology | ■ Water, Stormwater, Wastewater Management |

The scope of professional services that are provided by or offered out of each GAI office including, but not limited to, engineering and surveying services, is governed by the professional and business licensing requirements of each individual State or jurisdiction in which the GAI office is located and whether GAI has the requisite professional and business licenses for that State or jurisdiction. Nothing on GAI's Web Site or marketing materials is intended to be interpreted or construed as offering to perform professional licensed services where prohibited unless the licensing requirements have been met. Surveying services are not offered out of GAI's Kentucky location.

