



# SEL ENGINEERING SERVICES AND SOLUTIONS

## CONSULTING SERVICES

- Owner's engineer
- Project criteria development
- FEED and needs analysis studies
- Applied R&D and simulation
- Asset management and resiliency
- Root-cause and forensic analysis
- BKM and standards improvement
- Cost/benefit and risk analysis
- Independent review
- Post-project assessments
- Grid modernization

## AUTOMATION SERVICES

- SCADA design and implementation
- HMI design and implementation
- Synchrophasor systems
- SEL Real-Time Automation Controller (RTAC) settings and configuration
- RTU replacement
- Control panel design and integration
- DNA® (Distribution Network Automation)
- Event monitoring, collection, and analysis
- Intelligent electronic device (IED) integration
- Equipment condition monitoring
- MOTORMAX® Low-Voltage Motor Management and Protection System
- NERC PRC-005 solutions
- Metering settings and reports
- Renewable integration
- Security system design
- Radio path studies

## PROTECTION SERVICES

- Protection scheme designs and system protection planning
- Protective relay settings and documentation
- Conversion of electromechanical relay settings
- Relay retrofit/replacement applications
- Protection panel design and integration
- Relaying standard development
- Event analysis and troubleshooting
- Arc-flash studies and hazard mitigation schemes
- System modeling and studies
- Generator synchronizing systems
- Phase-shifting power transformer protection
- NERC PRC, FAC, TPL, and MOD compliance
- NRC and NEI open-phase detection
- Falling conductor detection
- VT/CT sizing
- Metering and power quality applications
- IEC 61850 engineering
- Multiplexer design
- PLC and microwave scheme design

## SUBSTATION ENGINEERING SERVICES

- Conceptual design and evaluation
- Structure/foundation design
- Physical security
- Control building design
- Equipment ratings studies
- AC station service design
- DC system design
- Equipment plans, elevations and sections
- Lightning protection design
- Surveying
- Geotechnical evaluations
- Permitting
- Site grading and drainage
- Containment system design
- Spill prevention control and countermeasure
- Grounding design
- Cable raceway design
- Cable schedules
- BOM development
- Engineering cost estimates
- Project scheduling
- Construction support



## **POWER MANAGEMENT CONTROL SYSTEMS**

- Load shedding
- Generation control
- Load management
- Synchronization
- Automatic islanding
- Volt/VAR optimization
- Islanded and grid-connected operation
- Metering and monitoring
- Engineering toolsets
- Remedial action schemes

## **MICROGRIDS**

- Blackout prevention technology
- Deterministic microgrid controllers
- Integrated protection systems
- Control of point of common coupling (PCC)
- Seamless islanding controls
- Inverter and conventional dispatch
- Renewable generation integration
- Energy storage integration
- Integrated power quality metering
- Emissions and cost optimization
- Grid support functions
- Dynamic system protection

## **SYSTEM MODELING AND STUDIES**

- Planning and feasibility studies
- Event analysis
- Protection coordination and settings studies
- Transient/dynamic stability studies
- Power quality and harmonic analysis
- Motor-starting studies
- Equipment-sizing reports
- Hardware-in-the-loop testing

## **TRANSMISSION PLANNING STUDIES**

- Transient/dynamic stability studies
- Small signal stability studies
- Voltage stability studies
- Congestion/load growth studies
- Path-rating and transfer capabilities studies
- Import and export studies
- Transmission and load interconnection studies
- NERC MOD-026 and MOD-027 studies

## **NETWORKING AND CYBERSECURITY SERVICES**

- Security assessment study
- Two-day, fixed-fee, onsite security assessments
- Vulnerability assessments (paper and active)
- Security policy framework review/creation
- Incident management
- Secure remote access
- Network and server design and hardening
- Specialized software solutions
- Centralized secure data management system
- Log management and engineering
- Password management
- NERC CIP compliance services
- Mock audit, vulnerability assessments, and patch management outsource
- Transient device management, policy/procedure review/creation, and baseline management

## **TESTING AND COMMISSIONING SERVICES**

- Hardware-in-the-loop testing
- Factory acceptance tests (FATs)
- In-field site acceptance tests (SATs)
- Relay testing, installation commissioning, field commissioning support, and secondary injection testing
- Firmware validation testing
- Laboratory scheme validation
- NERC CIP compliance support

## **TRAINING SERVICES**

- Custom project training
- Project training collateral

## **DESIGN AND DRAFTING SERVICES**

- One-line and three-line ac and dc schematics (breaker control drawings, relay I/O, and SCADA)
- Panel layouts, logic diagrams, wiring diagrams, communications/network diagrams, circuit/cable schedules, and BOMs
- Site investigation
- Raster conversion of scanned drawing images
- Custom cabinets and switch racks
- Development of standard drawings
- AutoCAD® and MicroStation® drawing formats



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