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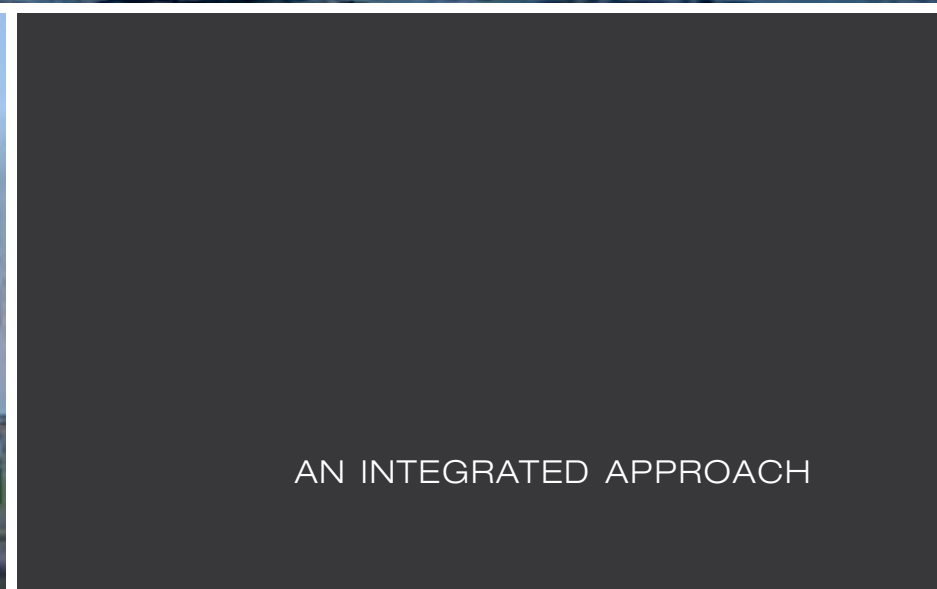
 SEBESTA
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PROFILE



Utility providers have a regulatory requirement to provide reliable power to their customers. The pressures of changing regulations, advancing technologies, an aging workforce, and the forces of competition have utility providers focusing on new methods of achieving operational excellence in the generation and distribution of power.

Sebesta Blomberg delivers innovative solutions that meet or exceed our client's expectations for a well-planned and delivered project. We provide innovative engineering, economic, and planning services for electric utilities, rural electric distribution cooperatives, investor-owned utilities, municipal utilities, public utility districts, independent power producers, and industrial clients nationwide. Our experienced professionals can assist you in developing a comprehensive plan and are committed to providing our clients with solutions that reduce work content, resulting in lower operational costs, and improved efficiency.



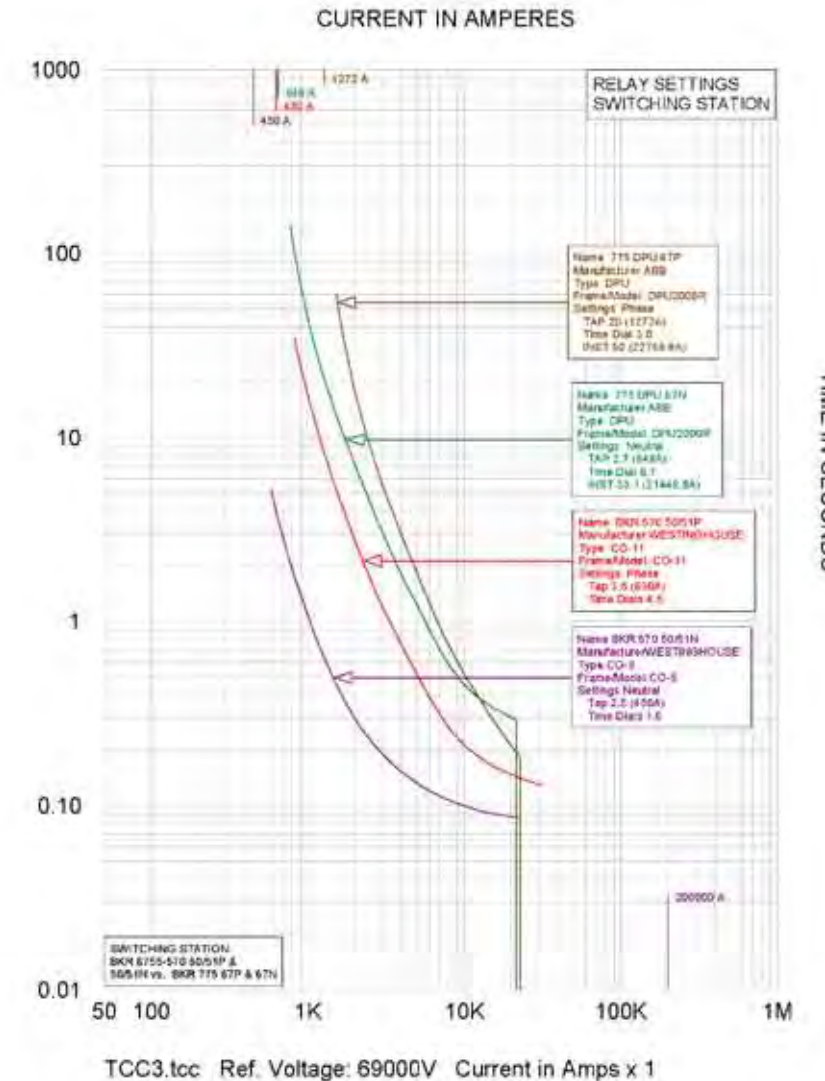
Sebesta Blomberg successfully utilizes a macro approach, providing solutions that consider the impact of all aspects of facility operations with your overall business goals and objectives. Our goal is to help you integrate your systems, reduce costs and improve operations. We understand that the economic and operational realities of your project include efficiency, maintainability, planning for expansion, and providing flexibility in operations. Our approach, combined with our extensive design knowledge and hands-on experience, allows us to provide that extra service which makes the difference between an adequate project and exceptional project.

AN INTEGRATED APPROACH

- SUBSTATION PHYSICAL DESIGN
- SUBSTATION RELAY AND CONTROL DESIGN
- SUBSTATION UPGRADES
- PROTECTION AND CONTROL PANEL DESIGN
- PROTECTIVE RELAYING COORDINATION STUDIES
- RELAY SETTINGS
- UNDERGROUND DISTRIBUTION DESIGN
- SIMPLE CYCLE AND COGENERATION FACILITY DESIGN
- STAND-BY AND LONG-TERM PARALLEL DIESEL GENERATION DESIGN
- GENERATOR AUXILIARY SYSTEM DESIGN
- GENERATION FEASIBILITY STUDIES
- POWER QUALITY
- SYSTEM CAPACITY/RELIABILITY STUDIES
- POWER SYSTEM ANALYSIS
- ENVIRONMENTAL PERMITTING
- START-UP AND COMMISSIONING



Having partnered with Minnesota Power since 1997, Sebesta Blomberg was retained to provide services on several projects, including 115 and 230 kV line protection replacements, RTU replacements, and digital fault recorder modifications. Design services were provided for the replacement of over 20 - 115 kV and 16 - 230 kV control and protection panels at multiple substations. Work included modifications to station-wide breaker failure relaying, physical layout of equipment, and power wiring. At Arrowhead substation, Sebesta Blomberg performed the control design in replacing an RTU. This consisted of modifying existing control drawings and the creation of new drawings for the new panel. At several Duluth substations, design services were provided for the replacement or addition of digital fault recorders.



Sebesta Blomberg completed coordination studies encompassing a significant portion of their service territory. The study included overcurrent, directional overcurrent, and transformer differential relaying setting as well as a breaker failure scheme. One-line diagrams were made for each station and transmission line.

Recommendations were made to replace inadequate existing relaying schemes with new systems to improve system protection and reliability. SKM Power Tools was utilized to complete the overcurrent coordination with the creation of time current coordination curves. For this coordination, Sebesta Blomberg provided the client with a final report for each station, including a summary of the different power source contingencies, listing the settings for each relay or type of fuse, and giving a narrative for each relay and time current coordination curve.



Sebesta Blomberg was retained to provide engineering and procurement services for the installation of a new 115-23kV substation to replace the existing substation jointly owned by Grand Rapids Public Utilities and Minnesota Power. The project included the installation of new substation equipment, while transferring equipment from the existing substation to the new location. This included design of the relay and control panels for all of the 115 kV line breakers, bus differential and RTU panels. Sebesta Blomberg also provided the relay and control design and the specifications for the new 23 kV switchgear for Grand Rapids Public Utilities at the substation. The particular challenges of this project involved the creation of procurement and construction specifications which included both the public and private bidding process required for each owning entity.



Located in Luverne, Minnesota, Minwind Energy operates over 15 MW of wind energy in Southern Minnesota. In support of Minwind's wind turbine efforts, Sebesta Blomberg completed an Arc Flash Study for wind turbines and 34.5 kV collection system. This effort included modeling Minwind's entire system up to the interconnection point, including the 161 kV - 34.5 kV substation, completing a short circuit analysis, creating Arc Flash Hazard labels for all relative equipment, and suggesting methods for mitigating Arc Flash hazards.



With electric needs growing an estimated 2.1% annually, Otter Tail Power Company was looking for ways to meet current demands. To improve electrical reliability long-term, Otter Tail planned for the addition of two new 115 kV - 20 MVAR capacitor banks with current-limiting reactors, circuit breakers, and disconnect switches at the existing Cass Lake substation.

Sebesta Blomberg assisted with the evaluation and sizing of equipment used in the design. The scope of work included physical design, ground grid design, battery sizing calculation, and design of control and protection drawings. It was necessary that the design be completed quickly to allow adequate time for construction which was scheduled to begin in the fall. The grounding design was critical to this project due to extremely high soil resistivity and required additional efforts to meet requirements.



McLoughlin Substation in Portland, Oregon, required the design of the control and protection relaying for the 115 kV bus, due to dated electromechanical relays that needed replacement. Relaying for two transformer breakers, six line breakers, and one tie breaker required eight new relay panels, including a new 115 kV bus differential panel. The tie breaker was unique and used to substitute any 115 kV breaker with their relay transfer scheme using old RTS switches at each breaker panel for substituting the relaying and control of each 115 kV breaker. The new RTS scheme incorporated a selector switch at the tie breaker relays to switch settings group per breaker being substituted. New and existing drawings were developed and modified for the fabrication and installation of relay panels showing additional wiring changes for replacing old relaying. The construction set consisted of 154 drawings, including control house physical layout, panel elevations and all associated schematics, and wiring diagrams.



Sebesta Blomberg designed the new relay protection for a 360 MW coal fired power plant (Genoa Station) and a 430 MW coal fired power plant (J.P. Madgett Station). Both stations included upgrades to the generator protection, auxiliary power system protection, reserve auxiliary power protection and the line protection to the unit breaker.

The scope of work not only included the design of the panels, but also coordination of the installation during plant outages, relay settings, and the commissioning of the new protection with plant operations. Both projects were completed successfully within the allotted outage schedule. The Genoa project was completed in nine weeks from the start of the design to the completion of the panel commissioning.



Minwind Energy owns and operates the Rock County Substation in Luverne, Minnesota. This substation is the interconnection point to the 161 kV power system for 12 MW of wind generation owned and operated by Minwind Energy. A 1 MW NaS battery is connected to the 34.5 kV substation bus.

Sebesta Blomberg is providing third party drawing review for substation modifications, owner's representation, relay settings review, and equipment sizing and review. This is an ongoing effort to support existing and future equipment for Minwind Energy.



Sebesta Blomberg planned, designed, and commissioned the Fourth Street Switching Station in Minneapolis, a 40 MVA indoor switching station to replace an existing unit. It is made up of four 13.8 kV buses configured in a ring bus arrangement, and is fed with four 10 MVA 13.8 kV feeders from the commercial utility. There are also two 2 MW diesel engine generator sets connected to two of the four buses for standby and peak shaving power.

The Fulton Switching Station is a 40 MVA underground switching station on the south side of the East Bank campus that Sebesta Blomberg planned, designed, and commissioned to relieve the load off of an existing station. The station was initially built with four 13.8 kV buses and then expanded to six buses. The station includes fixed capacitor banks for power factor correction and current limiting reactors for reducing fault current on the distribution circuits.

Sebesta Blomberg planned, designed and commissioned the replacement and expansion of the West Bank Switching Station, a 30 MVA, indoor switching station. It is made up of three 13.8 kV buses and the switch station vault is located inside a teaching and research building. This design required coordination and reconfiguration of the existing 13.8 kV distribution system.

The Fitch Avenue Chilled Water Plant is a 17,000-square-foot building that contains a new electrical switch station, which replaced the existing station by installing arc-resistant switchgear in a new building. Switchgear was replaced that was beyond its useful service life that provides increased redundancy for the electrical distribution system. The switchgear also feeds new chilled water equipment that is installed in the upper level of the facility, which was needed to bolster the existing system. Sebesta Blomberg planned and designed the new switching station, including the structure, equipment specifications, calculations, and significant modifications to the underground electric distribution system to integrate the new facility to the existing system.