



Electrical Engineer (FC), GS-0850-11

Standard Position Description Number: REN0400

Introduction

This position is located in an operating office (Office) within the Bureau of Reclamation (Reclamation) within the Department of the Interior (Department). This position provides electrical engineering expertise for a variety of projects and activities throughout the Office which typically include combinations of complex features. Electrical engineering includes design, studies, diagnostics, automation, electric reliability compliance and other compliance evaluations, controls, analyses, construction administration, documentation, inspections, assessments, investigations, reviews, cost estimating, specifications writing, applied research, and evaluating facility capacities and operations. Electrical engineering assignments may specialize in one or more specialties: Design, Construction Management, Operations and Maintenance (O&M), Systems Analysis, Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA), and Diagnostics and Testing. Complex features/facilities include hydroelectric generating powerplants; transmission systems; pumping plants; buildings; and multipurpose water conveyance, treatment, and storage systems such as dams, canals, pipelines, tunnels, desalination, and related appurtenant systems. Electrical systems include communication, control, and security systems (e.g., ICS, SCADA); interior and exterior lighting; generators, motors, pump-generators, generator step-up transformers, station service equipment, switchyard equipment, and auxiliary systems.

Major Duties

Engineering Analysis (minimum 25% of work time)

Performs engineering analyses to include performing and/or coordinating technical planning activities; data collection (including validation and management); design; modeling and data analyses; analyses of site location and/or conditions; troubleshooting electrical equipment and systems; and risk estimation and analyses. Analysis may also include evaluating engineering aspects of state and Federal regulatory and permitting programs, electric reliability compliance programs, and power contracts. Makes engineering recommendations and/or decisions based on engineering analysis. Below are general descriptions of specialty area analyses:

- **Design:** Completes and/or reviews engineering designs of electrical systems to include: 1) planning and conducting engineering studies or evaluations such as preliminary, appraisal, feasibility, final design, value planning/value engineering, and contractor designs; 2) creating, performing, reviewing, checking, and/or modeling engineering designs, contractor submittals & transmittals, including performing analytical calculations and computer-aided design and drafting; 3) developing/drafting design criteria, procedures, instructions, and material specifications; 4) contributing to the design and/or modifications of new and existing complex features; 5) performing field acceptance testing; and/or 6) preparing various levels of construction cost estimates for planning, final design, and procurement (e.g., Independent Government Cost Estimates (IGCE) and contract modifications) for the construction of complex features.
- **Construction Management:** Work primarily involves the performance and/or oversight of on-site construction work, including inspection and acceptance of facility or utility construction work performed by a contractor. Duties may include serving as a Contracting Officer's Representative (COR), reviewing designs for constructability, drafting specifications, determining and evaluating construction sequencing, researching and preparing appropriate levels of cost estimates (including reviewing and evaluating third party cost estimates) through all phases of the planning and final design process.
- **O&M:** Provides electrical engineering expertise in the O&M of complex features/facilities. Plans and/or coordinates scheduled and emergency (breakdown) maintenance, repair, and modifications. Identifies, analyzes, and troubleshoots problems, performs diagnostic testing, distinguishes relevant and irrelevant information to make logical decisions and develops solutions to resolve problems, mitigate future risks and optimize reliability. Synthesizes and trends O&M data and test results into job plans, corrective maintenance plans, and/or justifications for strategic/capital asset plan recommendations and reports.

- **System Analysis:** Work primarily involves technical electrical engineering studies including transient and subtransient reaction studies, power flow studies, fault studies, stability studies, arc flash analyses, and dynamic calculations; technical studies resulting in equipment recommendations for new and existing equipment type, size, capacity, and ratings including power transformers, distribution transformers, circuit breakers, surge arresters, cables, bus, protective relays, disconnect switches, fuses and other equipment, as required.
- **ICS and SCADA:** Work involves analysis, troubleshooting, testing, evaluating, optimizing, and programming ICS and SCADA (systems that receive data from remote sensors measuring process variables); comparing the collected data with desired setpoints; and deriving command functions which are used to control a process through the final control elements, such as control valves. Designs and prepares technical specifications for additions and modifications to communications networks including microwave systems, optical carriers, local-area networks, load/frequency/generation control systems, powerline carriers, mobile radio systems, telephone systems, telemetry systems, fire alarm and security systems, and various other electronic equipment used to operate water and power facilities. Analyzes, schedules, and installs system patches as appropriate. Performs technical analysis assuring installations meet security requirements and utilizes monitoring tools to ensure efficient and effective operation of infrastructure.
- **Diagnostics and Testing:** Reviews standards of performance and maintenance techniques, including schedules and types of tests performed; performs specialized diagnostic tests on electrical equipment; and evaluates test data and the corrective measures performed to assure adherence to existing procedures and instructions. Based on review, test results, and analysis, recommends improvements to methods, operations, and types of equipment used or modifications to equipment. Provides technical recommendations in establishing proper maintenance intervals and scope of maintenance required.

Documentation and Presentation

Prepares and reviews technical documentation such as technical memorandums and reports, engineering study analyses and results, correspondence, publications, design criteria, calculations, design summaries, design standards, designer's operating criteria, drawings, job plans, forecasted capital budget plans, operating procedures, evaluation and oversight reports, value studies reports, inspection and assessment reviews, impact assessments, permit applications, emergency action plans and exercises, construction plans and reports, quantity estimate worksheets, specifications, constructability reviews, solicitation packages, required planning, final design, and/or procurement construction cost estimates such as IGCE and contract correspondence including responses to submittals and Request for Information (RFI). Makes oral presentations of technical documentation at coordination meetings, design briefings, or other technical briefings, in some cases in support of compliance and audit activities. May review for comment draft Reclamation directives, standards, policies, and power technical documents (e.g., Facilities Instructions, Standards and Techniques (FIST), power equipment bulletins (PEB), power reliability compliance bulletins (PRCB)).

Investigations, Assessments, and/or Inspections

Plans, schedules, coordinates, and conducts electrical engineering facility examinations, reviews, and/or inspections which include conducting condition assessments and construction and transfer inspections; identifying and addressing deficiencies relative to design criteria, applicable codes and standards, or state or Federal statutes or regulations; calculating preliminary estimates for repairs; coordinating with internal and external partners; documenting and presenting results; conducting root cause analyses; analyzing unexpected event reports; conducting accident and incident investigations; and identifying future needs for the asset investment such as extraordinary maintenance and rehabilitation. Assignments may include participating in Periodic Facility Review or Comprehensive Review Reports in accordance with Reclamation and Department policies, directives, and standards.

Reviewing and Mentoring

Provides technical reviews, peer reviews, and/or checking of designs, drawings, engineering analysis, and technical documents (e.g., trip reports, project notes), specifications, and contract correspondence, ensuring documents are accurate

and quality assurance processes were followed. Provides technical guidance, training, and advice to lower graded engineers and technicians and other internal and external stakeholders.

Other Duties (non-grade controlling/non-series controlling work)

- **Project Management:** Develops, monitors, and manages project plans that outline the scope, schedule, and budget of assigned projects. This includes: coordinating and communicating with other groups and offices throughout the organization such as program and project managers, engineering, finance, maintenance, permit compliance, and acquisition; managing changes to the project plans with external stakeholders, transmission owners, tribes, and regulatory authorities; identifying and addressing issues prior to adverse impacts to the schedule and budget; and participating on technical teams.
- **Contracting Officer's Representative (COR)/Grants Officer's Technical Representative (GOTR):** Works with Contracting Officer/Grants Officer to implement and administer a variety of assigned contracts, including construction contracts, service contracts, P.L. 93-638 Indian Self Determination and Education Assistance Act as amended contracts/agreements, interagency agreements, and financial assistance agreements. Initiates timely actions and technically monitors the contract/agreement to ensure that they are carried out to completion as outlined in the contract/agreement. Researches the background on problems, identifies and devises courses of action in coordination with the Contracting Officer or Grants Officer as appropriate, and prepares recommendations for decision by management. Certain projects and activities require certification as a Contracting Officer's Representative (COR) and/or Grants Officer's Technical Representative (GOTR).
- **Compliance:** Provides engineering support in connection with regulatory program oversight, policy and rulemaking efforts, review of regulatory compliance issues, and resolution of engineering related issues as they are encountered. Ensures compliance with applicable electric reliability requirements (e.g., NERC, WECC).
- **Database Operation:** Develops, modifies, and utilizes relational databases to maintain engineering data for conducting operational and planning analyses. Coordinates development and operation of engineering data collection systems directly and/or in coordination with other government agencies and non-Federal sources. Ensures necessary data is collected, transmitted, downloaded, decoded, and received for its intended purpose.
- **Technical Working Groups:** Participates on technical work groups or teams. May collaborate on teams external to the organization, including external stakeholders and partners.

Performs other related duties as assigned.

Factors

Factor 1. Knowledge Required by the Position (Level 1-7 1250 pts)

Broad professional knowledge of, and skill in applying, a wide range of electrical engineering theories, concepts, principles, standards, methods, and practices sufficient to provide advisory services in engineering analyses, documentation, and investigations, and in the planning and/or design process; and to provide engineering design, analyses, review, inspection, and/or documentation for a wide range of electrical engineering assignments involving combinations of complex features which require adaptation of precedents and existing strategies to meet the special demands of the specific assignment.

Knowledge of the principles and concepts of electrical generation, transmission, and marketing; and knowledge of high, medium, and low voltage hydro-generation equipment and the associated control, protection, excitation, relaying, and auxiliary systems.

Familiarity with the principles and practical concepts and processes of other related engineering and physical and biological/environmental science disciplines in order to ensure connection, contribution, or inclusion of the multiple disciplines involved in electrical engineering assignments.

Skill in identifying, conceptualizing, and developing solutions to engineering problems or needs, and skill in planning and conducting studies and reviews and developing technical documents such as site reviews, feasibility through final designs, and associated guidance criteria, procedures, and instructions. Ability to develop new insights into situations and knowledge of new and emerging engineering methods and technology to apply when addressing engineering problems and needs.

Knowledge of engineering data collection methods. Knowledge of and skill in evaluating data sources within Reclamation and industry. Skill in identifying and assessing the data needed for design development and engineering assignments, including site assessments.

Knowledge of automated engineering systems and applications in order to effectively and efficiently plan, gather the appropriate data for input into the system, and assess, interpret, and analyze the validity of the generated results. Skill in using computers, software applications, databases, and automated systems to accomplish engineering assignments which may include programming, scripting, and/or coding.

Skill in effectively conveying information to individuals or groups, taking into account the nature of the information (e.g., technical, sensitive). Skill in writing in a clear, concise, organized, and convincing manner for the intended audience. Ability to establish collaborative working relationships with stakeholders to ensure that their needs are heard and addressed; identify and analyze problems; distinguish between relevant and irrelevant information to make logical decisions and develop solutions and communicate effectively with all levels and types of organizations and audiences. Ability to use established partnerships to achieve collaborative solutions and resolve problems; utilize project management and/or team building tools to achieve results in a collaborative spirit; and analyze diverse viewpoints to make planning decisions and solve work problems.

Knowledge of Reclamation and Office mission, structure, projects, and facilities. Knowledge of project benefits, authorities, stakeholders, and their governing laws, statutes, regulations, compacts, and treaties. Knowledge of asset criticality and risk assessment methodology and processes.

Knowledge of and skill in applying cost estimating practices and principles to develop construction cost estimates for the planning, final design, and procurement (e.g., IGCE and contract modifications) of complex features.

Knowledge of and skill in applying qualitative and quantitative analytical techniques and project management principles, methods, tools, and techniques in order to develop, schedule, coordinate, monitor, and manage projects and resources.

Knowledge of administrative activities associated with contracting and agreement actions, procedures, and options, and working knowledge of the associated documents and contract and agreement actions in order to assist the Contracting Officer/Grants Officer in performing contract administration functions. COR or GOTR responsibilities may require specific training and/or certification.

Knowledge of and skill in applying Federal Acquisition Regulation (FAR) requirements and Construction Specifications Institute (CSI) guidelines for drafting contract documents.

Factor 2. Supervisory Controls (Level 2-4 450 pts)

The supervisor outlines overall objectives and available resources and the incumbent and supervisor, in consultation, discuss scope of the assignment, methods, and time frames. The incumbent plans and carries out projects and assignments and resolves most conflicts independently and coordinates and collaborates with stakeholders to accomplish the work. The incumbent interprets policy and regulatory requirements in terms of established objectives and keeps the supervisor informed of progress and potentially controversial problems, concerns, issues, or other matters. Throughout the project or activity, the incumbent develops changes to plans and/or methodology and provides recommendations for improvements

in order to meet program/project objectives. The supervisor reviews completed work for soundness and quality of overall approach, effectiveness in meeting requirements or producing expected results, the feasibility of recommendations, and adherence to requirements.

Factor 3. Guidelines (Level 3-3 275 pts)

Guidelines include applicable Reclamation and Department instructions, policies, and procedures; national and state codes, standards, regulations, and compliance standards for electrical engineering; manufacturers' literature; precedents for similar situations; applicable Federal, state, and tribal resource laws and regulations; and applicable construction management regulations/guidelines such as the FAR, applicable Code of Federal Regulations (CFR), and CSI. Such guidelines are not always directly applicable and may have gaps in specificity; however, precedents are available outlining preferred approaches to more general problems or issues. The incumbent uses judgement to consider precedents and to research, select, interpret, modify, adapt, and apply the guidelines to the specific problems or issues at hand.

Factor 4. Complexity (Level 4-4 225 pts)

Engineering projects and activities involve the following complicating factors: design data is not readily available or there is a large amount of data to work through when determining the most relevant data to work with for the specific project; the need to develop representative and accurate cost estimates when electrical engineering data and scope may not be well defined or mature; diversity of the design and review activities - the nature of the engineering assignment can vary significantly; integrating many systems into one project; high profile projects and projects that involve operational losses; balancing creativity and engineering judgment to best address the needs of the activity and stakeholders; the need to stay informed regarding the latest technology and/or methodologies and how it can be incorporated into specific engineering solutions; aging infrastructure and dealing with existing footprints often require unique and well formulated engineering solutions and designs that incorporate existing conditions; incorporating accessibility, cultural resource or environmental considerations; addressing unanticipated problems; managing changes to the project scope, budget, and schedules. The incumbent must ensure application of sound engineering judgment and principles while addressing these complexities without compromising the engineering integrity of existing features and associated systems. The incumbent must recognize the relationships of the systems involved and exercise judgment and resourcefulness to ensure the design or engineering solutions and recommendations can be integrated into the existing systems. Some assignments may involve interpretation of engineering aspects of Federal and state laws, regulations, or policy for engineering support in compliance assignments. Additional complexities include collaborating with multiple stakeholders with competing interests, goals, and objectives; coordinating projects for/with Federal, state, tribal governments, and/or local entities with overlapping roles and authorities.

Factor 5. Scope and Effect (Level 5-3 150 pts)

This position provides electrical engineering expertise for a variety of projects and activities throughout the Office which typically include combinations of complex features. Assignments involve applying precedents and established techniques to resolve a variety of conventional problems, issues, or conditions. The work impacts the design, operation, or safety of the complex features. Due to the nature of the features being part of Reclamation's mission of delivering power to the Bulk Electric System and water to stakeholders, the work impacts the well-being of the general public and impacts the Department's and Reclamation's credibility with internal and external customers.

Factors 6. & 7. Personal Contacts and Purpose of Contacts (Level 6-3 and 7C 180 pts)

Personal contacts include counterparts and employees within the immediate Office and other offices throughout Reclamation, as well as other Federal agencies. Contacts also include representatives from other local, state, tribal governments, water districts and commissions and from industry such as architecture and engineering firms, transmission owners, manufacturers' representatives, and contractors. Contacts are for the purpose of obtaining, clarifying, and exchanging information and data as part of engineering activities, as well as exchanging professional expertise and experience; planning, coordinating, and advising on work efforts; and participating on teams. Requires collaboration skill and skill in dealing with individuals with differing views.

Factor 8. Physical Demands (Level 8-1 5 pts or Level 8-2 20 pts)

- (Level 8-1) The work is typically performed in an office setting with no special physical demands. However, work may also be performed in the field which involves periods of moving about worksites, bending, climbing, or driving motor vehicles to worksites.
- (Level 8-2) The work regularly combines both office and field assignments. Field work requires physical exertion, such as long periods of standing, or recurring and considerable walking, stooping, bending, crouching, crawling, and climbing such as in regular and periodic construction activities and field inspections. Work may also include frequent lifting of moderately heavy items weighing less than 50 pounds. Field assignments may involve driving motor vehicles to work sites in remote locations requiring overnight stays.

Factor 9. Work Environment (Level 9-1 5 pts or Level 9-2 20 pts)

- (Level 9-1) The work is usually performed in an office setting. However, work time may also be spent periodically visiting field sites. Field site visits are typically performed in either an outdoor setting subject to weather changes, diverse terrain, and safety hazards associated with working around complex features and/or construction, or an industrial setting subject to noise, fumes, and moving machinery. Both settings may require the use of personal protective equipment. The work may also involve some overnight travel for training, meetings, and site visits. Safety precautions and protocols are observed at all times and the incumbent complies with safety instructions and regulations and ensures individual and others' safety by promptly reporting unsafe acts, unsafe conditions, and accidents to the supervisor.
- (Level 9-2) The work involves regular and recurring exposure to moderate risks, discomforts, and unpleasantness such as: high noise levels, infectious materials, or toxic or irritating chemicals; travel in safety approved small aircraft and watercraft; high winds and low or high temperatures; infestation of dangerous reptiles or poisonous plants, snakes, or insects; adverse weather conditions; noxious fumes; flammable liquids; or radiation. The work involves performing tasks in close proximity to rotating heavy mechanical and electrical machinery and may involve working within confined spaces for extensive periods of time. Special safety precautions such as protective clothing and gear are necessary. Safety precautions and protocols are observed at all times and the incumbent complies with safety instructions and regulations and ensures individual and others' safety by promptly reporting unsafe acts, unsafe conditions, and accidents to the supervisor.

Total Points and Grade Conversion

Total Points = 2540 (low) 2570 (high)

Point Range = 2355-2750

Grade = GS-11

Other Significant Facts

Functional Classification (FC): Completed by servicing human resources office and annotated on PD Cover Page.

Certification: Certification and/or training to serve as a Federal Acquisition Certification (FAC) COR or GOTR may be required as articulated in Department and/or Reclamation policies.