

ENGINEERING COMPETENCIES

ENTRY LEVEL ENGINEER

Responsible for performing entry level engineering analysis, design, plan, review and inspection for small to medium projects and/or designated segments of larger complex projects in a specific engineering discipline for an assigned functional area. Job requires application of professional engineering concepts, principles, practices and methods sufficient to perform a broad range of engineering activities in a variety of work environments. Guidance may be provided by an experienced engineer with the entry level engineer being required to exercise some judgment in interpreting, analyzing and adapting methods, techniques and procedures to specific cases. Initially completed work is reviewed for technical soundness, appropriateness and compliance with standard engineering practices.

Occupation-Specific Technical Requirements

- **Design**
 - Assesses project needs, oversees or conducts engineering design and plant or system performance review, reviews engineering documents, and provides guidance to management on project requirements
 - Identifies the problem or opportunity through the collection and analysis of data
 - Applies problem solving approaches, such as brainstorming, fishbone diagramming, and engineering theory to electric system projects
 - Determines the specifications for the solution and develops conceptual design for new facilities, collaborates with others to reach consensus, and issues engineering documents to initiate design and construction
 - Reviews, evaluates and implements new technologies that support best practices in areas that include, but are not limited to work management, outage restoration, and the planning and scheduling of work.
 - Uses logical thought processes to analyze information and draw conclusions
 - Identifies inconsistent or missing information
 - Critically reviews, analyzes, synthesizes, compares and interprets information
 - Tests possible hypotheses to ensure the problem is correctly diagnosed and the best solution is found
 - Is able to read and interpret Process and Instrumentation Drawings
 - Is able to prepare, read and interpret blue prints and one line diagrams
 - Uses drafting instruments, engineering and mathematical references and tables, charts, computer equipment, accepted documentation processes required to perform professional engineering studies, calculations, analysis, estimates, etc

- Interprets and condenses field notes to prepare and/or oversee the preparation of plans, maps and drawings
- Maintains accurate filing and records system for projects from initiation to project close out
- Conducts preliminary engineering studies
- Operates various computer aided engineering design, analysis programs and tools
- Understands, applies and maintains compliance with regulatory and industry standards and requirements (e.g., NERC, FERC, ANSI, IEEE, NEC, etc.)

- **Project Planning**
 - Determines project requirements and estimates resources
 - Conducts economic analyses to determine optimum plan
 - Creates an effective project plan
 - Prioritize tasks
 - Create milestones
 - Anticipates project constraints and creates alternative plans
 - Monitors project status against the plan and reports on the results
 - Provides input for requests for proposal (RFP's) and assists in the analysis of responses
 - Provides input into the preparation of contracts and participates in the negotiation of revisions, changes and additions to contractual agreements with architects, consultants, clients, suppliers and subcontractors.
 - Performs contract administration and construction inspections for minor projects
 - Prepares and submits budget estimates and progress and cost tracking reports.
 - Acts independently on technical matters in the assigned field of expertise and recommends approval of professional services, materials & construction procurement contracts.
 - Ensures correct material is available and expedited for the construction of the project
 - Conducts repair versus replace analysis on equipment
 - Conducts lease versus buy analysis for project equipment
 - Conducts labor analyses to determine run/don't run decision making

- **Construction**
 - Interprets and explains plans and contract terms to administrative staff, workers, and clients
 - Takes actions to deal with the results of delays, bad weather, or emergencies at construction site
 - Inspects and reviews projects to monitor compliance with building and safety codes, and other regulations.
 - Studies job specifications to determine appropriate construction methods
 - Selects, contracts and oversees workers who complete specific pieces of the project
 - Ensures all appropriate permitting is obtained

- **System Operation, Maintenance and Repair**
 - Designs tests for and assists in the investigation of relaying and control scheme problems.

- Develops and implements manual and automated test plans for equipment
- Prepares load analysis for distribution substations and develop remediation plan for substations that warrant corrective action
- Develops operating information which serves as a knowledge base for responding to various contingency conditions on the power delivery system
- Evaluates, prepares and recommends distribution system protection coordination schemes and conduct fault studies for the proper application of fuses, reclosers and substation relay settings
- Conducts engineering analysis and develops recommendations to maintain and improve plant and system efficiency, reliability, safety, environmental compliance and cost performance.
- Implements programs to maintain facility assets in the most efficient and effective manner in order to meet or exceed asset life expectancy.
- Performs engineering studies and Root Cause Analysis to predict plant/system equipment performance.
- Identifies defects and failure modes, assesses current operating practices, determines cost benefit analysis on equipment deficiencies and then develops modifications to current configuration that will improve overall performance.
- Develops integrated performance system for effective monitoring and optimization of units and systems.
- Recommends equipment, new concepts and techniques to improve performance, simplify construction, reduce costs, correct design or material flaws, or comply with changes in codes or regulations.
- Understands the requirements of other disciplines, electrical engineering, mechanical engineering, civil engineering
- **Other**
 - Understands and applies the information technology required for distributed control, communications and automation components of Smart Grid
 - Is able to seamlessly integrate new technologies with legacy technologies without compromising safety or reliability
 - Understands legislative and regulatory functions and their impact on the design and construction of new plant or rebuild of existing plant
 - Collaborates in the development of industry standards such as NERC reliability, compliance development strategies, etc
 - Applies a basic understanding of finance and engineering economics
 - Is able to clearly and effectively communicate with corporate managers, end customers and engineers from other departments
 - Understands the basics of systems engineering, IT fundamentals, communications systems basics to help bridge the gaps across disciplines to avoid engineering re-designs.

Occupation-Specific License, Education and Certification Requirements

- Bachelor of Science degree in Engineering from an accredited four year university
- Must be able to attain a Professional Engineer license within 5 years of employment
- Must be able to attain a State Boiler license (where applicable)
- Must be able to attain project manager certification

3+ YEAR EXPERIENCED ENGINEER

Performs and/or leads others in performing engineering analysis, design, plan, review and inspection moderately complex/major projects in a specific engineering discipline for an assigned functional area. Job requires application of advanced engineering concepts, principles, practices, methods and standards, sufficient to perform a broad range of complex engineering activities in a variety of work environments. Guidelines are limited, requiring initiative and resourcefulness in researching precedents, trends and patterns to select or develop new methods and techniques. Resolves new and unusual problems and recommends solutions to unique circumstances and situations. Completed work is evaluated periodically for effectiveness in meeting requirements or specified results. Regular contact with individuals in internal and external leadership positions is required to influence and motivate others to achieve project objectives.

Occupation-Specific Technical Requirements

- **Design**
 - Performs engineering calculations and estimates
 - Collects, organizes and interprets a variety of project related information to incorporate into new project design
 - Identifies, analyzes and recommend engineering alternatives
 - Conducts preliminary engineering studies
 - Performs original design work, plans, specifications and cost estimates
 - Performs field inspections

- **Project Planning**
 - Plans, schedules and leads all phases of moderately complex utility projects in a specific discipline in an assigned functional area
 - Prepares and interprets engineering plans and specifications and communicating technical requirements to contractors
 - Assigns, schedules, monitors and reviews the work of others, including contractors
 - Conducts preliminary engineering studies, including gathering pertinent data, analyzing alternatives and performing related calculations
 - Serves as project manager on moderately complex projects

- **Construction**
 - Researches, develops and prepares recommendations for alternative engineering solutions and selects, modifies or adapts standards, techniques and procedures in assigned functional area
 - Performs contract administration and construction inspections for moderately complex projects, including reviewing final plans, specifications, special conditions and agreements
 - Provides detailed interpretation of plan specifications, conditions and agreements with others

- Coordinates the work of contractors
 - Maintains work record data
 - Writes change orders
 - Monitors safety and labor compliance activities
- **System Operation, Maintenance and Repair**
 - Ensures proper operations of substation and/or distribution equipment, voltmeters and voltage recorders
 - Assists in day to day operations on outage restoration with crews
 - Is able to perform operations during large outage restorations, including investigation of voltage or equipment problems with customers and the system
 - Performs, analyzes and reviews short and long term planning studies and makes recommendations for operational and planning solutions
 - Develops daily operational and long term plans for utility projects that comply with company, government and regulatory criteria
 - Reviews plans for conformity with laws, ordinances and accepted professional standards that pertain to engineering discipline and area of specialty

Occupation-Specific License, Education and Certification Requirements

- Bachelor's degree from an Accreditation Board for Engineering and Technology (ABET) accredited college or university plus a minimum of three (3) years engineering work experience, which must include work experience in the specialty area required
- Or, Master's degree from an ABET accredited college or university plus at least two (2) years of engineering work experience
- Professional Engineer license