



Mechanical Engineer, GS-0830-9

Standard Position Description Number: REN0900

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 carries out conventional or routine mechanical engineering assignments throughout the Office, which typically include a variety of geographic locations. Mechanical engineering assignments may specialize in one or more specialties: Design, Construction Management, and Operations and Maintenance (O&M). Complex features/facilities include hydroelectric generating powerplants; pumping plants; buildings; and multipurpose water conveyance, and storage systems such as dams, canals, pipelines, tunnels, desalination, and related appurtenant systems. Mechanical systems include piping systems, heating ventilation and air conditioning (HVAC), fire protection, water treatment process systems, large gates, fish handling equipment, cranes, hoists, elevators, turbines, and pumps.

This SPD may be used in conjunction with the other BOR Mechanical Engineer SPDs for developmental purposes or may be used as a stand-alone GS-9.

Major Duties

Performs these major duties (Reviewing; and Engineering Analysis) on a regular and recurring basis with Engineering Analysis being performed a minimum of 25% of the work time.

Reviewing

Works with higher graded engineers to develop skills for technical reviews, peer reviews, and checking of designs, drawings, engineering analysis, technical documents, specifications, cost estimates, and contract correspondence, ensuring documents are accurate and quality assurance processes were followed. Reviews may be outside of the organization or designed by others.

Engineering Analysis (minimum 25% of work time)

Performs conventional and routine engineering analyses assignments associated with technical planning activities; data collection; design; modeling and data analyses; analyses of site location and/or conditions; troubleshooting equipment and systems; and risk estimation and analyses. Provides engineering recommendations and/or analysis for conventional or routine assignments or for portions of more complex engineering projects and assignments.

Below are general descriptions of specialty area analyses:

- Conducts and participates in engineering studies or evaluations such as preliminary, appraisal, feasibility, final design, and value planning/value engineering, and contractor designs;
- creating, performing, reviewing, checking, and/or modeling engineering designs, contractor submittals and transmittals, including performing analytical calculations and computer-aided design and drafting;
- in a developmental capacity, helps develop design criteria, procedures, instructions, and material specifications;
- selecting and applying general engineering procedures for the design and modifications of new and existing complex features/facilities;
- performing field acceptance testing and/or design, installation, commissioning, and testing instrumentation to provide engineering data for analysis and/or operational decision support; and/or
- help develop testing procedures to address unique operational constraints including the design and fabrication of custom test equipment necessary to safely and effectively address non-typical issues;

Documentation and Presentation

Drafts technical documentation for conventional or routine engineering assignments or for assigned portions of complex projects 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, 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 Independent Government Cost Estimates (IGCE) and contract correspondence including responses to submittals and Request for Information (RFI). Makes internal presentations of technical documentation, in some cases in support of compliance and audit activities.

Investigations, Assessments, and/or Inspections

Participates in mechanical 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; documenting results; conducting root cause analyses; participating in accident and incident investigations; and identifying future needs for the asset investment such as extraordinary maintenance and rehabilitation.

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

- **Project Management:** Drafts and/or monitors project plans that outline the scope, schedule, and budget of assigned projects. This includes: collaboration and communication; identifying 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).

Performs other related duties as assigned.

Factors

Factor 1. Knowledge Required by the Position (Level 1-6 950 pts)

Professional knowledge of, and skill in applying, mechanical engineering theories, concepts, principles, standards, and methods sufficient to perform conventional or routine engineering analyses and design; prepare engineering documentation and participate in investigations and in the planning process; and to provide engineering design, analyses, review, inspection, and/or documentation for conventional and routine mechanical engineering assignments, selecting the best solution from several precedented alternatives.

Practical knowledge of the fundamental principles and concepts of mechanical equipment and 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 mechanical engineering assignments.

Ability to identify, conceptualize, and develop solutions to conventional engineering problems or needs, and skill in conducting routine studies and reviews and developing technical documents. Ability to perform and interpret calculations, analyses, and computations involving well-understood mechanisms.

Knowledge of common engineering data collection methods. Knowledge of data sources within Reclamation and industry. Skill in identifying and assessing the data needed for engineering assignments.

Knowledge of automated engineering systems and applications in order to 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 conventional 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). Skill in writing in a clear, concise, and organized manner. Ability to establish collaborative working relationships; identify and analyze problems; and determine relevancy of information to make logical decisions and develop solutions.

Understanding of cost estimating practices and principles to draft routine construction cost estimates for planning, final design, and procurement (e.g., IGCE and contract modifications).

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

Knowledge of and skill in applying qualitative and quantitative analytical techniques and project management principles, methods, tools, and techniques in order to monitor project plans 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.

Factor 2. Supervisory Controls (Level 2-3 275 pts)

The supervisor discusses potential problem areas and defines objectives, priorities, and deadlines. The supervisor or higher graded engineer provides assistance to the incumbent on controversial or unusual situations without clear precedents. The incumbent independently plans and carries out assignments in conformance with policies and practices and adheres to instructions and precedents when exercising judgment to resolve commonly encountered work problems. The supervisor or higher graded engineer reviews completed work for conformity with policy, technical soundness, adherence to deadlines, and accomplishment of objectives. Methods for completing assignments are not typically reviewed.

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 mechanical 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), National Society of Professional Engineers, Code of Ethics for Engineers, and Construction Specifications Institute (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 4-3 150 pts)

Engineering projects and activities involve the following complicating factors: there is a large amount of data to work through when determining the most relevant data to work with for the assigned project; the need to develop representative and accurate cost estimates; diversity of the design; balancing creativity and engineering judgment to best address the needs of the activity; the need to stay informed regarding the latest technology; aging infrastructure and dealing with existing footprints require engineering solutions and designs that incorporate existing conditions; incorporating accessibility, cultural resource or environmental considerations; addressing diverse factors, situations, and conditions. Assignments require analyzing and evaluating phases, conditions, and problems related to the conventional mechanical engineering assignment; assessing implemented and planned actions for accuracy, feasibility, and adequacy in meeting the objectives of the engineering assignments; and selecting the most appropriate course of action from many acceptable alternatives.

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

This position carries out conventional or routine mechanical engineering assignments throughout the Office. 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. Mechanical engineering projects and activities have significant effect upon the operations of Reclamation projects, as well as Reclamation's ability to meet its program goals. Engineering activities impact the overall operational efficiency and effectiveness of the facilities in delivering power to the Bulk Electric System and water to the stakeholders. Mechanical engineering assignments impact the efficiency, feasibility, integrity, accuracy, adequacy, and safety of a wide range of Reclamation activities, or the activities of organizations within a regional or equivalent geographic area. Engineering assignments impact the life, health, and property 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 6-2 and 7B 75 pts)

Personal contacts include counterparts and employees within the immediate Office and other offices throughout Reclamation, as well as from industry such as architecture and engineering firms, 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 planning, coordinating, and advising on work efforts, and participating on teams.

Factors 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 = 1885 (low) 1915 (high)

Point Range = 1855-2100

Grade = GS-9

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.