# STATE OF MONTANA
# JOB DESCRIPTION

*Montana state government is an equal opportunity employer. The State shall, upon request, provide reasonable accommodation to otherwise qualified individuals with disabilities.*

**Job Title: Civil Engineering Specialist Position Number: Career Ladder-multiple**

**Location: Helena**

**Department: Transportation**

**Program Area and Bureau: Project Development and Delivery/Bridge Bureau**

**Section and Unit: Bridge Design**

**Job Overview:** The Bridge Bureau is directly involved with the Planning, Design, Construction, Maintenance and Operation of bridges in Montana. The Bridge Design Section is responsible for Bridge Design and assistance during Construction. This work specifically includes structural analysis (design), and preparation of plans (detailing). This involves final technical review, specification writing and preparation of estimates. The Bureau provides technical advice needed to the Construction Bureau and District offices during the construction of bridges. The bureau also reviews structural shop drawings and provides some fabrication inspection services for bridge contracts involving structural steel.

Positions are responsible for conducting in-depth engineering and analysis, administer contracts, oversee projects and project design, and may serve as a lead worker. Work is assigned through instruction on specific engineering objectives and direction, and the incumbent determines the best solution based on established engineering guidelines, knowledge and skills. Completed work is reviewed for application of sound professional judgment. The Engineer is responsible for designing and developing construction plans and documents for bridge replacement and rehabilitation projects. This work involves evaluating the problem or proposal; interpreting data; analyzing a structural system; selecting alternatives; documenting designs and calculations; preparing plans and writing construction documents. The employee commits the Department to a specific course of action through this design work. Decisions made and methods used are based on the engineer's knowledge and judgement. The engineer is responsible for minimizing errors in their work and discovering errors in other's work during design reviews.

**Essential Functions (Major Duties or Responsibilities):**

**Entry level:**
Applies prescribed engineering techniques and engineering procedures in accordance with established criteria in order to perform assigned tasks. The work is routine and technical therefore does not require previous experience. Collects data, gathers information or documents, performs

standard computations or analysis and prepare drawings and visual aids. Possesses basic oral and written communication skills and interacts with other staff. The employee acquires an understanding of professional and ethical responsibilities and develops basic skills.

**Mid-level:**
Acquires basic engineering knowledge and develops skills in a specific assigned work area. Applies standard engineering techniques, procedures, and criteria to perform assigned tasks as part of a wide-ranging assignment. Exercises limited judgment on details of work and in application of standard methods for conventional work. Performs basic engineering design tasks and provides assistance to other tasks such as preparation of permit applications, material testing, drawings, and computer-aided design (CAD) work. Receives close supervision on unusual or difficult problems, and general review of all aspects of work and interacts with staff, general public, officials, and contractors.

**Top level:**
Performs routine engineering tasks in the assigned area with little or no supervision. Acquired engineering competence in a specific work area should reasonably transfer to other work areas at the same level.

**Prepare Structure Designs – 40%**

- Preliminary Design. Interprets field survey information, hydraulic reports and preliminary road grades to provide the type and length of structure required. Design accounts for horizontal and vertical clearance requirements and may require recommending a change in grade. Preliminary superstructure design is done at this time to establish required superstructure depth. Structure stationing is provided to the Road Design Section to assist in the preparation of their plans.
- Final Design. The final design converts the preliminary design into a set of documents suitable for a construction contract. This involves the final choices of member size and material type (such as steel or concrete) and develops connection details that define the structure physically and the level of quality required to realize the intention of the design. The structure design itself must be fully documented by calculation to determine that the design is both safe and efficient. The calculations define the loads in all reasonably expected combinations so that all potential weak points of the structural system are revealed.
- Computer Modeling and Programming. Creates computer models for determining stresses in structural elements. Results of these models are used to document the design and determine the final configuration of an element. Develops computer programs or adapts computer applications to aid in time consuming and repetitious calculations for design problems which may require sophisticated and advanced analysis techniques or mathematical modeling.
- Assesses data from a variety of internal and external sources. Determines how to address the overall design process. Coordinates work with other disciplines, federal and state agencies and tribal or local governments. Prepares a design package that is accurate,

constructible and cost effective. Adjusts standards and practices to fit routine encounters conflicting information, views or interests.

- Prepares design packages incorporating the following: General layout/plan and profiles, Design details, Avoidance and mitigation measures, Quantities and cost estimates, Special provisions
- Prepared to conduct dynamic engineering design activities in field and on-site environments, providing problem resolution.
- Prepares documentation of reviews and decisions on project related issues. The documentation includes milestone reports (e.g. Preliminary Field Review Report, Scope of Work Report, Plan-In-Hand Report etc.), meeting minutes and other project-related decisions. Documentation involves proposed solutions, the evaluation process and the basis for the final decisions

**Check Structure Designs – 35%**

- Reviews preliminary and final designs. Validate all assumptions, calculations, dimensions and specified levels of quality in preliminary and final designs prepared by other engineers. Peer review of the items described above in the Prepare Structure Designs section.
- Investigates product failure or trend. Gathers various information from multiple sources such as surfacing design information, materials information, materials testing results, construction reports and interviews. Determines solution based on judgment of the quality and accuracy of what is available and draws conclusions or recommends actions based on findings.
- Assesses the capabilities of entry level engineers, technicians or administrative staff and provides appropriate assignments. Reviews work for accuracy and provides technical guidance as needed.

**Prepares Project Specifications and Calculate Cost Estimates. – 20%**

Creates project specifications for inclusion in the contract documents. Project specifications (Special Provisions) describe unique construction requirements, sequences, methods and materials. The Engineer determines the construction bid items for a project and calculates total quantities of the items from the contract documents. Monitors bid price trends and recommend unit prices for the preparation of the engineer's estimate and the subsequent commitment of funds to the particular project. This employee also checks calculations and unit price estimates prepared by other engineers or designers.

- Prepares draft special provisions to address unique situations, materials and construction practices. Ensures that the method of measurement and basis of payment correspond to the project plans and that the special provisions do not conflict with MDT's Standard Specifications.

**Other Duties as Assigned. – 5%**

**Supervision**
The number of employees supervised is: 0.
The position number for each supervised employee is: n/a

**Physical and Environmental Demands:**

- Work is performed in an office setting or in the field on construction projects
- Travel is required and can vary from a few times per year, with one or more overnight stays to extensive overnight travel that may occur on short notice, weekends and holidays and working outdoors in all types of weather.
- Duties may be performed on active construction sites in close proximity of heavy equipment, hot asphalt and high-speed traffic.
- The work environment can involve harsh or caustic fumes, dust, extreme temperatures, wind, rain and snow.

**Knowledge, Skills and Abilities (Behaviors):**
This position requires advanced knowledge of the theory, principles, methods and techniques of Civil Engineering and the associated mathematics and physical sciences, especially the methods and practices of bridge structural design. This position must be familiar with AASHTO Design Specifications and standards, Bridge Bureau standards and policies, industry guidelines and practices, and bridge and road construction methods. The employee must have demonstrated skills at performing engineering analyses; and applying engineering concepts, techniques and procedures to a variety of situations and circumstances. The incumbent must be skilled at evaluating structural calculations and contract documents for clarity, accuracy, completeness and constructability; and identifying construction and design conflicts. This position requires skill at applying engineering judgement when interpreting design guidelines and standards. Skilled at preparing calculations, reports, and other documentation necessary to complete a design project. This position requires skill in the use of office engineering instruments including computers and hand held calculators. Effective written and verbal communication skills are also necessary for preparing plans and sharing information with designers, engineers, non-technical personnel, and the public.
Develops sufficient engineering knowledge, skill and judgment in a specific practice area to perform the routine engineering tasks in the assigned area. Although the knowledge acquired is in a specific work area, that knowledge and competence should reasonably transfer to other work areas at the same level. Broad knowledge of engineering practices and principles and construction methods, processes and procedures, computer-assisted drafting and design software, and engineering techniques are required for projects of moderate complexity. A journey level knowledge of federal guidelines and procedures regarding road design and construction is also required.
Possesses effective oral and written communication skills in order to assist with client, customer, or official contacts and communication pertaining to specific assignments or meetings.

**Minimum Qualifications (Education and Experience):**

**Entry Level – Civil Engineering Specialist Level 1**

Bachelor's degree in Civil Engineering, Civil Engineering Technology, or a closely related field of study.

Related degrees may include Environmental Engineering, Geologic/Geotechnical Engineering,

Materials Engineer, Mechanical Engineering, or Engineering Science.

Prior work experience is not required for entry level.

**Mid-Level – Civil Engineering Specialist Level 2**

Bachelor's degree in Civil Engineering, Civil Engineering Technology, or a closely related field of study. Related degrees may include Environmental Engineering, Geologic/Geotechnical Engineering, Materials Engineer, Mechanical Engineering, or Engineering Science.

This position also requires a minimum of 6 months to 2 years of engineering or directly related work experience.

Certifications/licensure: Proof of passage of the Fundamental Engineering Exam (FE), Engineering Intern Certification (EIT), or licensed Professional Engineer.

**Top Level – Civil Engineering Specialist Level 3**

Bachelor's degree in Civil Engineering, Civil Engineering Technology, or a closely related field of study. Related degrees may include Environmental Engineering, Geologic/Geotechnical Engineering, Materials Engineer, Mechanical Engineering, or Engineering Science.

This position also requires a minimum of 2 years to 4 years of engineering or directly related work experience.

Certifications/licensure: Proof of passage of the Fundamental Engineering Exam (FE), Engineering Intern Certification (EIT), or licensed Professional Engineer.

**Special Requirements:**

*List any other special required information for this position*

☐ Fingerprint check

☒ Backgroun

☐

☐

d check

MFPE or Non-Union  Union Code

Valid driver’s license

Other; Describe

Safety Responsibilities

The specific statements shown in each section of this description are not intended to be all inclusive. They represent typical elements and criteria considered necessary to perform the job successfully.

**Signatures**

My signature below indicates the statements in the job description are accurate and complete.

| **Immediate Supervisor** | **Title** | **Date** |
|---|---|---|

| **Administrative Review** | **Title** | **Date** |
|---|---|---|

My signature below indicates that I have read this job description.

| **Employee** | **Title** | **Date** |
|---|---|---|

**Human Resources Review**

**Job Code Title: Engineering Analyst 1 Job Code Number: D25011**

My signature below indicates that Human Resources has reviewed this job description for completeness and has made the following determinations:

☐ FLSA Exempt ☒ FLSA Non-Exempt

☒ Telework Available ☐ Telework Not Available

☒ Classification Complete ☐ Organizational Chart attached

**Human Resources:**

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**Signature** **Title** **Date**