



PROFESSIONAL ENGINEER 1

3148

GENERAL DESCRIPTION OF CLASS

The PROFESSIONAL ENGINEER 1 applies a broad range of engineering theories and principles to complex transportation projects and develops solutions to engineering problems. Employees in this class provide technical advice to project teams, agency managers, and to city and county governments. They also review local agency or consultants' plans, recommend corrections or changes according to departmental standards and policies.

Positions may be assigned as the senior engineers in their units to train, plan, direct, and review the work of other engineering professionals and technicians. Employees in this class are the Engineer of Record for engineering contract plans or other engineering products.

DISTINGUISHING FEATURES

This is the third level of a four-level series. It represents the journey and full proficiency level. Employees at this level recognize and define engineering problems and evaluate methods for their solution, which requires a background of professional education or training and experience.

The nature and degree of complexity of the work distinguishes this class from the lower levels. At this level employees are experienced in the practice of engineering. This level is further distinguished from the lower levels by the nature of the assignments and the absence of close guidance and supervision.

The absence of responsibility to represent the agency as an expert in a highly complex field of specialization, or manage significant projects having a broad impact on the State's infrastructure distinguishes this class from the higher level. It is further distinguished by the absence of advising management on program or policy-related issues and leading in the development and strategic direction of a specialized engineering area.

DUTIES AND RESPONSIBILITIES

The duties listed below are not inclusive but characteristic of the type and level of work associated with this class. Individual positions may perform all or some combination of the duties listed below as well as other related duties.

1. Design

Design and prepare plans for transportation facilities. Representative projects include bridges and related structures, freeway widening, new interchanges, Interstate maintenance, new construction or major reconstruction of state highways, urban highways, safety/operation improvements, Intelligent Transportation System (ITS)-related improvements, emergency or high priority projects. Design highways; interchanges; intersections; bridges; structures; foundations; hydraulics for bridges, culverts and fish passage; water quality facilities; speed zones; signs; illumination; traffic signals; and transportation system changes to accommodate projected traffic. Coordinate the resolution of design or project development issues on project teams. Prepare or review the engineering plans, special provisions, specifications, and cost estimates for assigned projects. Recommend revisions to design-related policies and standards.

Review and critique engineering designs and related documents prepared by engineering consultants. Recommend acceptance or corrections to engineering contract plans prepared by engineering consultant firms based on state and federal engineering standards.

Make informational presentations on assigned projects to project teams, local agencies, and citizen groups. Testify in court or hearings if litigation arises for assigned projects.

2. Professional Engineer Support

Provide engineering expertise and assistance to projects such as local agencies' project development, project construction, planning studies, access permits, development review activities, rail crossings, public transit facilities, light rail projects, and maintenance operations. Review proposed improvements or developments and their associated impacts to the highway system.

Research information and develop specifications and warrants for traffic control devices and other new products. Prepare written reports on findings. Make recommendations for use on highway projects.

Conduct speed zone, accident, bridge, geotechnical, and hydraulic investigations. Make engineering recommendations concerning safety and operations. Inspect and evaluate structures and make recommendations on the urgency of deficiencies, and develop options for repair and/or replacement. Develop bridge contract maintenance projects.

Review engineering designs and plans for complex engineering projects being developed by local agencies to ensure that completed proposals will function as required by state and federal engineering standards. Serve as consultant to city and county officials in the development, design and construction of federally funded road and street projects. Administer state and federal road and street programs to local governments and investigate projects in progress to ensure conformance with state and federal laws.

3. Transportation Analysis and Research

Do specialized engineering studies, establish data collection methods, and test and evaluate products, systems, and structures. Analyze, identify and design solutions to complex engineering problems. Develop and administer procedures and programs for transferring transportation technology among federal, state, and local agencies.

Do complex traffic engineering, environmental, and other transportation system planning analyses on major projects and urban area transportation systems. Coordinate and review analyses, computer models, and reports on transportation related studies. Give input on agency planning efforts for traffic congestion topics. Conduct advanced engineering planning to project future transportation needs.

4. Field Engineer

Administer complex construction projects to verify that contractor work is compliant with plans and specifications; analyze and solve problems; and negotiate agreements for solutions with contractor. Lead construction crew personnel doing inspection, surveying, design, quality and quantity compliance, project documentation, and related work.

Coordinate design changes with design Engineer of Record to make certain project design fits field conditions. Make decisions on construction, materials, and design to verify project meets engineering practices and methods and agency standards and schedules.

RELATIONSHIPS WITH OTHERS

Employees in this class have regular in-person, telephone, or written contact with city, county, state and federal officials to answer questions and explain departmental policy and regulations; and with other

engineering professionals to exchange design, planning, and scheduling information or to resolve technically complex or controversial problems. There is periodic in-person or telephone contact with the public or contractor's representatives that may be adversarial in nature.

SUPERVISION RECEIVED

Employees in this class work independently, receiving general supervision from a higher-level engineer or engineering manager who reviews work upon completion for conformance to agency policy and engineering standards. Much of the technical work is completed without review. Employees use general and specific state regulations, state and federal engineering standards, guidelines and manuals to complete assigned work; and advise on or approve local government, consultants', and contractors' engineering products.

GENERAL INFORMATION

Positions in this class are located throughout the State and require the willingness to work under the conditions associated with the environment of the job. Some positions in the class may require the ability to climb, kneel, stoop, or walk over rough terrain when on a field inspection.

KNOWLEDGE AND SKILLS (KS)**General knowledge of:**

Theories, principles, practices, and methodologies of civil, structural, or traffic engineering science.
Advanced engineering mathematical techniques such as those gained through the study of calculus and differential equations.
Engineering design principles and techniques used to produce plans and drawings.
Principles and processes of public works construction projects.
State and federal engineering standards, guidelines, manuals, and procedures typically used for the engineering specialty.
Physical characteristics and properties of construction materials.
Composition, structure and properties of substances and the chemical processes and transformations that they undergo.
Materials, methods and the appropriate tools to construct structures typical to the engineering assignment.
Typical engineering software programs used to design, analyze engineering data, and model or predict information.
Contract management and project management principles and techniques.
Structure and content of the English language including the meaning and spelling of words, rules of composition and grammar.
Instructional methods and training techniques.

Skill to:

Apply professional engineering principles and theories to discipline of assignment.
Use advanced, inferential mathematics and statistics to solve engineering problems.
Make engineering computations sufficient to the level of assignment.
Analyze needs and requirements to create a design.
Weigh the relative costs and benefits of a potential action.
Analyze and reconcile conflicting requirements of cost, safety, size, strength, performance, standardization and operation to design engineering solutions.
Organize, analyze, interpret and evaluate engineering problems and prediction of results.
Solve unique or unusual engineering problems.
Develop complete engineering plans and operating procedures.
Design and conduct studies to identify and recommend solutions to engineering problems.
Read and interpret plans and specifications.
Convert and explain verbally and in writing complex technical data in an understandable manner to a variety of people.
Prepare clear and concise reports suited to the needs of the audience.
Effectively represent the agency to the public and outside contractors, and testify in administrative hearings or court proceedings.
Direct and assess the work of other technical and professional engineering personnel.
Plan and manage multiple engineering projects concurrently.
Identify the scope and complexity of a project and assign segments of that project effectively.
Use computer programs to analyze engineering data or produce designs.
Apply principles, methods and techniques of related professional disciplines.

NOTE: The KNOWLEDGE and SKILLS are required for initial consideration. Some duties performed by positions in this class may require different KS's. No attempt is made to describe every KS required for all positions in this class. Additional KS requirements will be explained on the recruiting announcement.

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Revised

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