



## ASSOCIATE IN ENGINEERING 1

3146

### GENERAL DESCRIPTION OF CLASS

The ASSOCIATE IN ENGINEERING 1 does entry-level work applying basic professional engineering theory, principles and methods. Employees do a variety of office and fieldwork in the discipline of transportation or civil engineering.

### DISTINGUISHING FEATURES

This is the first level of a four-level series. Employees learn engineering standards and how to apply them, how to use design software, and how to apply engineering education in a business setting. Employees are assigned small, routine, or less complex transportation related projects designed to provide experience and training in specialized engineering disciplines. Employees at this level receive detailed and continuous instruction or assistance from a higher-level engineer or supervisor and use limited independent technical judgment.

The lower degree of complexity of assigned work, the limited independent technical judgment and the close supervision received, distinguishes this class from the higher levels.

Positions in this class may do similar assignments to positions allocated to the Civil Engineering Specialist class series. The assignments are designed primarily to give practical experience to prepare the academically trained employees for the full range of professional work and responsibility. Assignments may also overlap with the Civil Engineering class series when there is a direct line of promotion to positions in the agency.

### 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

Request and review field survey data. Obtain and evaluate traffic data and accident data to identify the problem and develop design solutions in compliance with state and federal design standards. Design horizontal and vertical alignments based upon survey data and existing highway alignments. Establish roadway cross-sections based upon design standards and site-specific conditions. Calculate earthwork quantities and prepare estimates of required construction materials. Design engineering contract plans for smaller or routine projects such as overlays, pavement reconstruction, minor widening, safety/operation improvements or minor bridge replacements. Prepare cost estimates for assigned projects. Analyze design alternatives to decide benefits regarding public safety, costs, environmental impacts, right-of-way, and meeting project goals. Assist higher-level designers with plan preparation, project cost estimating, and related tasks for portions of their projects. Do engineering reviews for training purposes.

Prepare preliminary and final engineering designs for pre-stressed single-span and two-span bridges. Do structural analysis and calculations on structures. Specify materials for bridge construction, including estimates of materials to be furnished by contractors. Review or approve contractor's shop drawings after designing bridges and draft engineering plans using drafting equipment or computer-aided design (CADD) system. Prepare cost estimates.

Design traffic controls such as signals and signs. Investigate and analyze traffic problems and prepare technical reports and correspondence. Review and recommend engineering contract plans for safety features, speed zones, traffic signal placement, and traffic signal timing.

Investigate surface and subsurface conditions for road construction, foundations, and slides. Request and evaluate subsurface surveys. Evaluate the structural support of roads and structures.

Conduct hydraulic studies to verify that bridges, culverts, and ditches are adequately designed to carry the water flows. Develop site hydrology. Perform bridge and culvert hydraulic modeling. Design erosion control features to prevent erosion or structural problems. Design water quality facilities.

## **2. Transportation Analysis**

Develop, analyze, and maintain transportation data to support transportation system planning, project selection, project development, project design and environmental analysis. Serve on project development teams and give technical expertise to guide project development and design. Assist in the development of data for large transportation and land use models.

## **3. Field Engineering**

Evaluate preliminary plans such as survey specification, alignments, typical sections, earthwork quantities, and drainage for accuracy and completeness. Review and recommend any proposed changes to plans and specifications. Design plans using CADD computer program for construction projects including geometric design of intersections, detours, accesses, stockpiles and roadway alignments. Coordinate with Engineer of Record and field personnel and prepare construction details such as drainage design adjustments, structure component elevations, and sign, signal, and illumination footing elevations. Create digital terrain model for new roadways. Prepare finished grades, cross sections, quantity calculations and cost estimates; document "As-Built" conditions.

Interpret contract documents on major field engineering projects to make certain that construction is compliant with plans and specifications. Suspend non-compliant contract work until the Project Manager is notified. Prepare required documentation for construction project, initiate contract change orders, coordinate work between project office and contractor, and implement project communication plan.

## **RELATIONSHIPS WITH OTHERS**

Employees in this class have regular contact, in person and by telephone, with employees in other units to coordinate and obtain information. They periodically contact, in person and by telephone, local government or consultant personnel to obtain or provide information.

## **SUPERVISION RECEIVED**

Employees in this classification work under the close guidance of a higher level engineer or engineering supervisor who assigns and reviews the work for compliance with engineering principles, standards, policies, and accuracy. An engineering manager provides general supervision. Employees use state regulations; state and federal engineering standards, guidelines and manuals to complete assigned work.

## **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:**

Engineering practices, statistics, and advanced mathematical techniques such as those gained through the study of calculus and differential equations.
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**Basic knowledge of:**

Theories, principles, practices and methodologies of civil or transportation-related engineering.
Construction and civil engineering guidelines, manuals and procedures typical to the discipline.
Computer programs typically used to analyze engineering data or produce designs.
Design techniques, principles, tools and instruments involved in the production and use of engineering plans, blueprints, drawings and models.
Materials, methods and the appropriate tools to construct structures.
Structure and content of the English language including the meaning and spelling of words, rules of composition and grammar.
Composition, structure and properties of substances and the chemical processes and transformations that they undergo.

**Skill to:**

Use advanced mathematics to solve engineering problems.
Weigh the relative costs and benefits of a potential action.
Organize, analyze, interpret and evaluate engineering problems and design solutions.
Read, understand and apply specific instructions found in technical manuals, specifications, contract plans and other guidelines.
Compile data and statistics, and apply engineering computations to design simple projects.
Communicate verbally and in writing with a variety of people; answer questions; and explain technical information, regulations and decisions in an understandable manner.
Prepare clear and concise written reports suited to the needs of the audience.
Establish and maintain effective working relationships with coworkers and supervisory personnel.
Organize and prioritize work to complete multiple assignments within the appropriate timeframe.

**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

STATE OF OREGON  
 Dept. of Administrative Services  
 Human Resource Services Division