STATE OF COLORADO

CLASS SERIES DESCRIPTION JULY 2015

ENGINEER

I2C1I* TO I2C7**
Specialty Areas

A. Civil
B. Electrical
C. Environmental/Health
D. Mechanical
E. Petroleum/Mining
F. Other

DESCRIPTION OF OCCUPATIONAL WORK

This class series uses seven levels in the Physical Sciences and Engineering Occupational Group and describes professional level work in an engineering specialty. Engineering consists of the performance of work requiring the use of mathematics, chemistry, physics, and engineering sciences, including the principles and methods of engineering analysis and design in specific disciplines.

As the work described by this class series constitutes the practice of engineering, positions at the Professional Engineer I and higher classes require licensure per CRS 12-25-101, et. seq. In order to meet this statutory license requirement, positions in the Engineer-In-Training II and III classes are expected to be enrolled in the Engineer Intern program with the State Professional Engineer and Professional Land Surveyor Board, and progress towards licensure.

ENGINEER-IN-TRAINING I I2C1T*

CONCEPT OF CLASS

This class describes the entry level engineer. Work is designed to train positions for a higher level in the class series. Although tasks are similar to those of the first-working level, assignments are structured and performed with direction and assistance from others. Positions carry out established work processes and operations by learning to apply and follow procedures, techniques, rules, and regulations. Once training has been completed, the position is to be moved to the next level. Positions should not remain in this class indefinitely.

ENGINEER-IN-TRAINING II I2C2T*

CONCEPT OF CLASS

This class describes the first-working level. Positions in this level build upon the basic engineering theories, concepts, and principles to become aware of and familiar with procedures and practices of their specialty area. The work includes utilization of most of the practices and methodologies of the agency and may be assigned tasks of increasing responsibilities requiring some originality and judgment.

Completed work is reviewed by higher level engineers.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the operational level, as described here. Within limits set by the specific process, choices involve deciding what operation is required to carry out the process. This includes determining how the operation will be completed. For example, positions decide how plans or proposals will be analyzed for conformance to bid requirements. By nature, data needed to make decisions are numerous and variable so reasoning is needed to develop the practical course of action within the established process. Choices are within a range of specified, acceptable standards, alternatives, and technical practices.

Complexity -- The nature of, and need for, analysis and judgment is patterned, as described here. Positions study engineering information to determine what it means and how it fits together in order to get practical solutions in the form of design plans or built structures. Guidelines in the form of standards, specifications, plans, manuals, or procedures exist for most situations. Judgment is needed in locating and selecting the most appropriate of these guidelines which may change for varying circumstances as the task is repeated. This selection and interpretation of guidelines involves choosing from alternatives where all are correct but one is better than another depending on the given circumstances of the situation. For example, positions select the most appropriate testing methods for ensuring contract compliance.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as an individual contributor. The individual contributor may serve as a resource or guide by advising others on how to use processes within a system or as a member of a collaborative problem-solving team.

ENGINEER-IN-TRAINING III I2C3**

CONCEPT OF CLASS

This class describes the fully-operational, non-licensed engineer. Positions in this level perform work with the responsibility to plan, organize and conduct engineering work on a variety of representative phases or projects. This class differs from the previous class in the Decision Making factor.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the process level, as described here. Within limits set by professional standards, the agency's available technology and resources, and program objectives and regulations established by a higher management level, choices involve determining the process, including designing the set of operations. For example, positions determine the set of review and testing operations to insure contract completion within terms and conditions. The general pattern, program, or system exists but must be individualized. This individualization requires analysis of data that is complicated. Analysis is breaking the problem or case into parts, examining these parts, and reaching conclusions that result in processes. This examination requires the application of known and

established theory, principles, conceptual
models, professional standards, and precedents in order to determine their relationship to the problem. For example, positions apply known engineering principles in deciding the appropriate design or construction changes. New processes or objectives require approval of higher management or the agency with authority and accountability for the program or system.

Complexity -- The nature of, and need for, analysis and judgment is patterned, as described here. Positions study engineering information to determine what it means and how it fits together in order to get practical solutions in the form of designs, construction plans, or engineering reports. Guidelines in the form of engineering standards or specifications exist for most situations. Judgment is needed in locating and selecting the most appropriate of these guidelines which may change for varying circumstances as the task is repeated. For example, positions select the most appropriate engineering specification to use for changes in equipment specifications. This selection and interpretation of guidelines involves choosing from alternatives where all are correct but one is better than another depending on the given circumstances of the situation.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as an individual contributor or as a work leader. The individual contributor may explain work processes and train others. The individual contributor may serve as a resource or guide by advising others on how to use processes within a system or as a member of a collaborative problem-solving team.

OR

The work leader is partially accountable for the work product of two or more full-time equivalent positions, including timeliness, correctness, and soundness. At least one of the subordinate positions must be in the same series or at a comparable conceptual level. Typical elements of direct control over other positions by a work leader include assigning tasks, monitoring progress and work flow, checking the product, scheduling work, and establishing work standards. The work leader provides input into supervisory decisions made at higher levels, including signing leave requests and approving work hours. This level may include positions performing most/all supervisory elements that do not fully meet the criteria for the next level in this factor.

PROFESSIONAL ENGINEER I I2C4**

CONCEPT OF CLASS

This class describes the fully-operational, professional (licensed) engineer. Positions in this level apply the engineering sciences and mathematics to analysis or design of projects or programs with engineering components. The work typically includes duties as responsible charge engineer which may involve lower level engineering positions. This class is distinguished from the Engineer-In-Training II class in professional (licensed) responsibility for engineering as is reflected in the higher level of Complexity.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the process level, as described here. Within

limits set by professional standards, the agency's available technology and resources, and program objectives and regulations established by a higher management level, choices involve determining the process, including designing the set of operations. For example, positions determine sets of inspection, testing, fiscal review, or safety compliance review operations to be used in analyzing engineering plan designs for new facility construction. The general pattern, program, or system exists but must be individualized. This individualization requires analysis of data that is complicated. Analysis is breaking the problem or case into parts, examining these parts, and reaching conclusions that result in processes. This examination requires the application of known and established theory, principles, conceptual models, professional standards, and precedents in order to determine their relationship to the problem. For example, positions decide solutions to construction problems based on a detailed examination of engineering principles and standards. New processes or objectives require approval of higher management or the agency with authority and accountability for the program or system.

Complexity -- The nature of, and need for, analysis and judgment is formulative, as described here. Positions evaluate the relevance and importance of engineering and mathematical theories, concepts, and principles in order to tailor them to develop a different approach or tactical plan to fit specific circumstances. While general policy, precedent, or non-specific practices exist, they are inadequate so they are relevant only through approximation or analogy. In conjunction with theories, concepts, and principles, positions use judgment and resourcefulness in tailoring the existing engineering guidelines so they can be applied to particular circumstances and to deal with emergencies. For example, positions tailor existing engineering specifications to deal with unique design needs.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as an individual contributor, or work leader. The individual contributor may explain work processes and train others. The individual contributor may serve as a resource or guide by advising others on how to use processes within a system or as a member of a collaborative problem-solving team. This level may include positions performing most/all supervisory elements that do not fully meet the criteria for the next level in this factor.

OR

The work leader is partially accountable for the work product of two or more full-time equivalent positions, including timeliness, correctness, and soundness. At least one of the subordinate positions must be in the same series or at a comparable conceptual level. Typical elements of direct control over other positions by a work leader include assigning tasks, monitoring progress and work flow, checking the product, scheduling work, and establishing work standards. The work leader provides input into supervisory decisions made at higher levels, including signing leave requests and approving work hours. This level may include positions performing most/all supervisory elements that do not fully meet the criteria for the next level in this factor.

PROFESSIONAL ENGINEER II I2C5**

CONCEPT OF CLASS

This class describes the supervisor or staff authority. In addition to work described in the Professional Engineer I class, positions in this level have responsibilities as unit supervisors or senior authorities with higher levels of decisions making or strategic planning duties. Positions direct lower level engineering positions in accomplishing professional engineering programs or
projects. This class differs from the Professional Engineer I level in the Line/Staff Authority factor

and possibly in the Decision Making, Complexity, and Purpose of Contact factors.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the process level, as described here. Within limits set by professional standards, the agency's available technology and resources, and program objectives and regulations established by a higher management level, choices involve determining the process, including designing the set of operations. For example, positions determine the most effective way to analyze engineering studies or proposals. The general pattern, program, or system exists but must be individualized. This individualization requires analysis of data that is complicated. Analysis is breaking the problem or case into parts, examining these parts, and reaching conclusions that result in processes. This examination requires the application of known and established theory, principles, conceptual models, professional standards, and precedents in order to determine their relationship to the problem. For example, positions decide solutions to construction problems based on a detailed examination of engineering principles and standards. New processes or objectives require approval of higher management or the agency with authority and accountability for the program or system.

OR

The decisions regularly made are at the interpretive level, as described here. Within limits of the strategic master plan and allocated human and fiscal resources, choices involve determining tactical plans to achieve the objectives established by the higher management (strategic) level. This involves establishing what processes will be done, developing the budget, and developing the staffing patterns and work units in order to deploy staff. For example, positions develop unit budgets and staffing requirements for operating an engineering unit. This level includes inventing and changing systems and guidelines that will be applied by others statewide. By nature, this is the first level where positions are not bound by processes and operations in their own programs as a framework for decision making and there are novel or unique situations that cause uncertainties that must be addressed at this level. Through deliberate analysis and experience with these unique situations, the manager or expert determines the systems, guidelines, and programs for the future. For example, positions determine design guidelines to be used for an agency's engineering program.

Complexity -- The nature of, and need for, analysis and judgment is formulative, as described here. Positions evaluate the relevance and importance of engineering theories, concepts, and principles in order to tailor them to develop a different approach or tactical plan to fit specific circumstances. For example, positions tailor engineering specifications to fit unusual design requirements. While general policy, precedent, or non-specific practices exist, they are inadequate so they are relevant only through approximation or analogy. In conjunction with
theories, concepts, and principles, positions use judgment and resourcefulness in tailoring the existing guidelines so they can be applied to particular circumstances and to deal with emergencies.

OR

The nature of, and need for, analysis and judgment is strategic, as described here. Positions develop guidelines to implement a program that maintains the agency's mission. Guidelines do not exist for most situations. In directive situations, positions use judgment and resourcefulness to interpret circumstances in a variety of situations and establish guidelines that direct how a departmental/agency program will be implemented. For example, positions interpret engineering needs and establish engineering standards or guides for an agency's facilities program.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as a unit supervisor or staff authority. The unit supervisor is accountable, including signature authority, for actions and decisions that directly impact the pay, status, and tenure of three or more full-time equivalent positions. At least one of the subordinate positions must be a Professional Engineer I or at a comparable conceptual level. The elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, signing performance plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer. NOTE: As a tradeoff (in lieu of supervising one Professional Engineer I), positions which supervise one in this series, or at a comparable level, and have Decision Making at the Interpretive level, may also be allocated to this class.

OR

The staff authority is a pacesetter who has a unique level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. It is an essential component of the work assignment that has been delegated by management to the position. This authority directly influences management decisions within an agency. For example, management relies on such a position when making decisions regarding the direction that policy or a program should take in the staff authority's field of expertise. Managers and peers recognize and seek this level of technical guidance and direction regarding the application of a program or system within the agency or to its clients. For example, such a position influences peers and managers alike on the application of new project management systems.

PROFESSIONAL ENGINEER III I2C6**

CONCEPT OF CLASS

This class describes the second-level supervisor or senior authority. In addition to the work described by the previous professional levels, positions in this level have responsibilities as a second level supervisor or as a senior authority in a field of engineering. This class differs from the Professional Engineer II in the Line/Staff Authority factor and possibly in Decision Making and Complexity factors.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the interpretive level, as described here. Within limits of the strategic master plan and allocated human and fiscal resources, choices involve determining tactical plans to achieve the objectives established by the higher management (strategic) level. This involves establishing what processes will be done, developing the budget, and developing the staffing patterns and work units in order to deploy staff. For example, positions develop unit budgets and staffing requirements for operating an engineering unit. This level includes inventing and changing systems and guidelines that will be applied by others statewide. By nature, this is the first level where positions are not bound by processes and operations in their own programs as a framework for decision making and there are novel or unique situations that cause uncertainties that must be addressed at this level. Through deliberate analysis and experience with these unique situations, the manager or expert determines the systems, guidelines, and programs for the future. For example, positions determine design guidelines to be used for an agency's engineering program.

Complexity -- The nature of, and need for, analysis and judgment is strategic, as described here. Positions develop guidelines to implement a program that maintains the agency's mission. Guidelines do not exist for most situations. In directive situations, positions use judgment and resourcefulness to interpret circumstances in a variety of situations and establish guidelines that direct how a departmental/agency program will be implemented. For example, positions interpret engineering needs and establish engineering standards or guides for an agency's facilities program.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as a manager or senior authority. The manager must be accountable for multiple units through the direct supervision of at least two subordinate Unit Supervisors; and, have signature authority for actions and decisions that directly impact pay, status, and tenure. Elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, second-level signature on performance plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer.

OR

The senior authority is a pacesetter who has a unique level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. It is an essential component of the work assignment that has been delegated by management to the position. This authority directly influences management decisions beyond the agency. Managers and peers seek this level of technical guidance and direction as the designer of a statewide system or in a subject area for other areas of state government. Managers and peers, both internally and externally to the agency, rely on this pacesetter when making decisions regarding the direction that policy, programs, and systems should take in the pacesetter's field of expertise.

PROFESSIONAL ENGINEER IV I2C7**

CONCEPT OF CLASS

This class describes the highest level engineer in this series. Positions in this level typically have responsibility for directing and administering engineering program areas for such things as long- range plans, equipment and resources, and the integration into other programmatic areas of the agency. A few positions in this class may function as leading authorities. This class differs from the Professional Engineer III in the Decision Making factor and possibly in the Line/Staff Authority factor.

FACTORS

Allocation must be based on meeting all of the three factors as described below.

Decision Making -- The decisions regularly made are at the programmatic level, as described here. Within limits set by organizational policy, general directives, overall goals and objectives, and allocated resources, choices involve formulating or adjusting programs, specifying program objectives, and allocating human and fiscal resources among constituent programs. This involves independently, and under conditions of uncertainty, determining what has been done, what can be done, proposals for long term policy, and estimates of what new resources are required. For example, positions determine the allocation of fiscal resources between competing engineering projects. The long-term strategic

plans, purposes, and staffing determined by this level require integration with other programs in the overall plan. Program, as used here, is defined by the mission of an agency or division as opposed to a segment or piece of a program, such as planning, program evaluation, etc. This level does not describe positions that are applying a program controlled by another agency which has the authority and accountability for it.

Complexity -- The nature of, and need for, analysis and judgment is strategic, as described here. Positions develop guidelines to implement a program that maintains the agency's mission. Guidelines do not exist for most situations. In directive situations, positions use judgment and resourcefulness to interpret circumstances in a variety of situations and establish guidelines that direct how a departmental/agency program will be implemented. For example, positions establish long range maintenance and repair programs for an agency's physical plant resources.

Line/Staff Authority -- The direct field of influence the work of a position has on the organization is as a manager, leading authority, or senior manager. The manager must be accountable for multiple units through the direct supervision of at least two subordinate Unit Supervisors; and, have signature authority for actions and decisions that directly impact pay, status, and tenure. Elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, second-level signature on performance
plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer.

OR

The leading authority is a pacesetter who has a rare level of technical expertise in a field or profession that, as part of the assignment, is critical to the success of an agency. This authority directly influences management decisions and peers in the profession outside of state government. Managers and peers throughout the nation recognize and seek this level of technical guidance and direction because of the recognized expertise in a subject area.

OR

The senior manager must be accountable for multiple units through the direct supervision of at least two subordinate Managers; and, have signature authority for actions and decisions that directly impact pay, status, and tenure. Elements of formal supervision must include providing documentation to support recommended corrective and disciplinary actions, second level signature on performance plans and appraisals, and resolving informal grievances. Positions start the hiring process, interview applicants, and recommend hire, promotion, or transfer.

DEFINITIONS

Civil: a field requiring application of general knowledge of the physical sciences and mathematics underlying specialties of soil mechanics, hydraulics, materials, structures/facilities, transportation/traffic, construction management, surveying, and/or water resources.

Electrical: a field requiring application of mathematics and the physical and engineering sciences as they apply to electrical sources, distribution, equipment, systems, and associated concepts and principles such as motive power, illumination, or the production of electric or magnetic fields. The applications are primarily directed at the design, construction, inspection, or operation of electrical power distribution systems and their uses, high voltage transmission, generation resource planning and load forecasting.

Environmental/Health: a field involving engineering work to improve and protect air, land, and water resources. It requires the application of engineering principles concerned with facilities and systems for controlling pollution and protecting the quality of resources and the environment, and to utilize chemical, biological, and public health services to control or eliminate pollutants. These applications are primarily directed at water and waste water treatment, air pollution, and hazardous material disposal systems.

Mechanical: a field requiring the application of the principles of thermo-dynamics, and other physical, mathematical, and engineering sciences in the design, construction, evaluation, and operation of mechanical systems.

Petroleum/Mining: This is the application of engineering principles dealing with the exploration and development of minerals, oil, and natural gas; the production, transportation, and storage of these products with emphasis upon the controls over their development.

Other: any specialty in other engineering fields not specifically covered by the above definitions or any other state special use classes.

P.E.: A professional engineer who is duly registered with the State Board of Registration for Professional Engineers and Professional Land Surveyors.

ENTRANCE REQUIREMENTS

Minimum entry requirements and general competencies for classes in this series are contained in the State of Colorado Department of Personnel web site.

For purposes of the Americans with Disabilities Act, the essential functions of specific positions are identified in the position description questionnaires and job analyses.

CLASS SERIES HISTORY

Updated and removed the purpose of contact 6.30.2015
Effective 7/1/08 (TMM). PSE System Maintenance Study. No changes. Published as proposed 7/31/07.
Effective 7/1/02 (DLF). PSE System Maintenance Study. Changed class titles for the three entry-level classes (I2C1-3). Published as proposed 5/02.
Effective 9/1/93 (DLF). Job Evaluation System Revision project. Published as proposed 6/11/93.
Revised 1/1/92. Changed occupational group to PSE, Supv. Public Utilities Engineering Analyst (A1218), Asst Principal Highway Engineer (A3117), Principal Water Resource Engineer (A3132).
Revised 7/1/89. Changed nature of work, options, and entrance requirements, Engineer A – Supv. Prof Engineer (A3136-41).
Revised 7/1/81. Changed relationship, Supv Public Utilities Engineering Analyst (A1218), Asst Principal Highway Engineer (A3117), Principal Water Resource Engineer (A3132).
Revised 7/1/80. Changed grade, relationship, nature of work, and entrance requirements, Supv Public Utilities Engineering Analyst (A1218).
Revised 3/1/80. Changed nature of work and entrance requirements, Principal Water Resource Engineer (A3132).

Revised 12/1/79. Changed entrance requirements, Asst Principal Highway Engineer (A3117).
Revised 11/1/79. Changed entrance requirements, Principal Water Resource Engineer (A3132).
Revised 5/1/78. Changed entrance requirements, Principal Water Resource Engineer (A3132).
Created 10/1/76. Supv Tramway Engineer (A3182).
Created 1/1/75. Supv Public Utilities Engineering Analyst (A1218), Asst Principal Highway Engineer (A3117), Principal Water Resource Engineer (A3132), Engineer A - Supv Prof Engineer (A3136-41).

SUMMARY OF FACTOR RATINGS

Class Level	Decision Making	Complexity	Line/Staff Authority
Engineer-in-Training I	n/a	n/a	n/a
Engineer-in-Training II	Operational	Patterned	Indiv. Contributor
Engineer-in-Training III	Process	Patterned	Indiv. Contributor or Work Leader
Professional Engineer I	Process	Formulative	Indiv. Contributor or Work Leader
Professional Engineer II	Process or Interpretive	Formulative or Strategic	Unit Supervisor* or Staff Authority
Professional Engineer III	Interpretive	Strategic	Manager or Senior Authority
Professional Engineer IV	Programmatic	Strategic	Manager, Leading Authority, or Senior Manager

ISSUING AUTHORITY: Colorado Department of Personnel & Administration