

STATE OF SOUTH DAKOTA CLASS SPECIFICATION

Class Title: Transportation Research Engineer

Class Code: 40863

A. Purpose:

Manages research projects and conducts research to develop, demonstrate, and deploy advanced technologies, methodologies, and knowledge; and improve cost effectiveness, efficiency, and safety of transportation systems.

B. Distinguishing Feature:

Transportation Research Engineers manage research projects and conduct research as principal investigators.

C. Functions:

(These are examples only; any one position may not include all of the listed examples nor do the listed examples include all functions which may be found in positions of this class.)

1. Assesses and defines needs, justification, priority levels, strategic plans, and anticipated work efforts for proposed research projects.
 - a. Performs preliminary investigations of research topics to formulate needs assessments.
 - b. Directs analytical activities of technical panels to define the scope, nature, and feasibility of performing proposed research.
 - c. Develops and documents project descriptions, including anticipated levels of effort, timelines, costs, and deliverables; and ensures they meet established needs.
2. Compiles final project parameters and initiates selection processes to solicit consultants or other researchers.
 - a. Develops requests for proposals which define problems and set goals and objectives, cost estimates, and project duration based on technical knowledge, literature reviews, and synthesizing technical knowledge of others.
 - b. Leads projects' technical panel members in the processes of choosing appropriate researchers to accomplish work efforts; and recommends selection of most qualified consultants based on relevant experience, technical merit of proposals, and probability of success.
 - c. Reviews proposals with technical panels and apprises selected consultants of necessary changes to their proposals.
 - d. Negotiates resolutions to problems and issues with consultants' proposals to arrive at final proposals.
 - e. Prepares contracts which outline budgets, terms and conditions, and legal rights.
3. Manages, coordinates, and oversees assigned research projects to ensure they are carried out and completed according to contractual agreements.
 - a. Oversees researchers' work efforts and ensures that work performance is in accordance with project definitions.
 - b. Makes sure researchers are receiving all relevant literature, data, materials, etc., from all agencies as necessary to accomplish work efforts.
 - c. Coordinates meetings, workshops, and other activities defined for research efforts.
 - d. Evaluates contractual performance obligations of researchers such as billings, reports, and other research products.
 - e. Evaluates and ensures the scientific and statistical validity of research methodology

- and technical products, appraises their quality, and develops reports of assessments.
- f. Reviews, verifies, and sanctions closure of research efforts including finalizing reports, project acceptance, contract closure, posting reports and results, forwarding recommendations, and developing implementation plans.
4. Facilitates implementation, or implements, results of research projects that span a broad spectrum of business areas such as planning, facilities design, operations and maintenance, construction, construction materials and surfacing, information technology, strategic planning, etc., to provide the level of expertise that ensures most effective adoption of research results.
- Develops plans, budgets, and timelines to implement new technology.
 - Develops plans for support and maintenance procedures following implementation.
 - Conducts training sessions and meetings to transfer technology.
 - Develops and executes plans to evaluate costs and benefits of implementation.
5. Performs research as an assigned research consultant and principal investigator to develop and implement research projects.
- Develops work plans that apply scientific and statistical methods to accomplish objectives and goals outlined by technical panels.
 - Prepares equipment and material specifications, trains personnel, schedules and coordinates activities necessary to accomplish research.
 - Selects, schedules, and facilitates focus groups.
 - Coordinates field and construction crews to install research test sections.
 - Analyzes research data using a variety of methods.
 - Designs test sections to incorporate new techniques or test methodologies into construction plans, and negotiates special contracts or construction change orders to facilitate implementation.
 - Prepares interim and final reports summarizing literature reviews, research methodologies, findings, conclusions; and recommendations for changes to policies, procedures, specifications, and standards.
 - Presents research findings to a department review board, other interested organizations, and at technical conferences.
6. Keeps current on prevailing transportation research initiatives, evolving engineering practices, innovative uses of construction materials, advancements in technology, and new concepts in performing work functions in various transportation business areas.
- Reads and reviews current documents, literature, and trade publications related to the industry.
 - Attends conferences, seminars, workshops, and other meetings of transportation professionals.
 - Exchanges information with peers at local, state, and national transportation agencies.
 - Initiates information exchange with department offices to learn about potential needs, to convey information from outside sources that may be of interest to them, and to solicit ideas for research initiatives particular to their business area.
 - Represents the department on state and national research committees and task forces.
7. Provides technical expertise to support administrative decision-making.
- Recommends revisions to, and new, specifications, procedures, and policies.
 - Conducts research and reports on material and products.
 - Investigates causes of problems that arise in transportation design, construction, maintenance, and operations; and recommends potential solutions to managers and

staff.

8. Performs other work as assigned.

D. Reporting Relationships:

Reports to an exempt program manager; does not supervise, but routinely provides technical direction over work done by contracted researchers, other department staff and interns, and other agencies involved in research projects.

E. Challenges and Problems:

Challenged to evaluate the potential effects of research projects. This is challenging because recommendations that change policies, procedures, standards, and specifications may have a far-reaching effect that is not immediately discernible. Further challenged to manage research projects effectively. This is difficult because technical panels are comprised of individuals who have special interests in research subjects and it is the project manager's responsibility to ensure those interests do not skew research objectives; the project manager often must educate panel members on project topics and research methods; the project manager must lead the panel in defining and matching project requirements with desired expertise deemed essential to perform the work; the project manager must maintain continual contact with researchers to keep them on time and on point, and to evaluate ongoing research results to ensure they meet project objectives; it requires facilitating meetings to achieve consensus where participants have a wide variety of skills, knowledge, and backgrounds; the project manager must make sure correct information about proposed research is disseminated to panel members, effected department programs, decision-makers, and researchers; it requires compiling an extensive body of work obtained through the study, and preparing and presenting a complete and fluent final report; and it requires implementation of research results to a wide variety of effected programs.

Problems include developing comprehensive work plans to include all project objectives; dealing with multiple projects simultaneously and acquiring necessary knowledge in all the areas involved; coordinating staff assistance with research components; reviewing work of well-experienced researchers for conformance with project objectives and technical validity; dealing with researchers who are behind schedule, ignore directions, and do not provide products as proposed; evaluating rapidly changing technologies and determining whether they will provide a benefit to the department or public; providing timely and appropriate solutions to problems when asked for technical assistance; and developing project adjustments that are workable when research work efforts turn out to be impractical.

F. Decision-making Authority:

Decisions include the most appropriate approach to assess needs for proposed research; setting the direction for technical panels' review, analyses, and discussions of proposed research; assignments for individual panel members, e.g., tasks, information-gathering, specialized reviews, etc.; content of work plans and overall approach to projects; most appropriate research methodologies to be used during the course of research; choice of researchers, whether in-house or consultant; negotiation of initial contracts with researchers including the scope of services expected, and acceptable prices; quality assessments of researchers' work throughout the project; acceptance of work performance and research products at critical checkpoints during the project, and final acceptance and closing; approval of work adjustment requests, time adjustment requests, payment, unforeseen and special needs requests; interpretation of implementation guidelines; recommendations for purchases based on research findings; recommendations for changes in standards and specifications; and recommendations for corrective actions for reports or products that do not meet established requirements.

Decisions referred to higher authority include approval of time extensions or extra funding; final approval of research project descriptions, requests for proposals, contracts, and budgets; final acceptance and implementation of panel recommendations; direction for studies; review of final reports and recommendations; authorization to purchase capital assets; assignment and priority of research projects; approval of changes to policies, procedures, and standards; and finalizing technical panel membership.

G. Contact with Others:

Weekly contact with department staff assisting with research projects regarding maintenance and updates of equipment and to exchange information; with staff engineers to elicit input on research studies; with vendors and suppliers regarding installation of equipment and project progress; with Bureau of Information and Telecommunications staff regarding progress of application development, system integration, and computer equipment installation; with corporations regarding research studies on construction materials; with university personnel involved in contracted studies; with panel members from various projects to exchange information and discuss project progress; and with consultants to get updates on project progress and routine reports; biweekly contact with other transportation agencies to provide information concerning research studies or to learn of their efforts regarding research studies; and with federal transportation research agencies regarding cooperative projects; monthly contact with department managers to provide information on project progress or to recommend changes to the department as a result of research.

H. Working Conditions:

Works in a typical office environment, in a laboratory, and on construction sites with some exposure to hazardous materials, heavy lifting, heavy equipment in operation, traffic, and weather conditions.

I. Knowledge, Skills, and Abilities:

Knowledge of:

- principles and practices of a technical discipline such as engineering or physical sciences;
- principles of systems and project management;
- scientific research methods;
- applicable state and federal transportation laws;
- department policies and procedures regarding project planning, development, design, and construction;
- the principles of effective human relations.

Ability to:

- communicate clearly and concisely, both orally and in writing;
- analyze technical reports and regulations;
- facilitate consensus among groups with diverse interests;
- effectively plan, organize, and prioritize work activities to meet schedules and deadlines;
- establish and maintain effective working relationships with a wide variety of people.