

STATE OF SOUTH DAKOTA CLASS SPECIFICATION

Class Title: Materials Laboratory Technician

Class Code: 040412

Pay Grade: GH

A. Purpose:

Operates and maintains a materials laboratory by supervising and performing testing on construction materials; compiling, calculating, and reporting results from all samples received; conducting research on new materials; ordering, updating, maintaining and calibrating laboratory equipment; testing and determining the acceptability of commercial suppliers' products; and training and overseeing personnel in testing methods to facilitate compliance with department specifications.

B. Distinguishing Feature:

The Materials Laboratory Technician provides technical expertise in testing and evaluative procedures relative to a specific area of materials and ensures methods and equipment comply with federal and state guidelines and standards; and oversees daily operations of a central laboratory.

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. Manages a central materials laboratory to evaluate material samples and tests and provide supporting data for project development, construction, and maintenance; and for validation of new products.
 - a. Assigns work to staff, provides work direction and training in procedures, and reviews test results on completed work.
 - b. Maintains and calibrates testing equipment and keeps appropriate documentation; and ensures updates are implemented.
 - c. Orders and maintains an adequate inventory of equipment, chemicals, and other supplies needed in the laboratory.
 - d. Assists the Specifications Engineer in writing and revising specifications by conducting research and validating materials and products used in highway construction.
 - e. Inspects region materials laboratories annually to ensure testing equipment meets department and federal standards.
 - f. Calibrates contractors' equipment with department equipment and recommends corrective adjustments.
 - g. Coordinates testing procedures with other laboratory managers.
 - h. Compiles and prepares equipment, supply, and capital asset needs for the annual budget request.
 - i. Prepares laboratory facilities, equipment, and personnel for inspection by National Institute of Standards and Technology (NIST) inspectors.
2. Conducts field work to provide supporting data necessary for project development.
 - a. Contacts landowners to get permission to drill in order to collect samples of materials, and locates and stakes out test holes on projects.

- b. Identifies and notes site problems that might affect construction costs, i.e., water, rock, faults, etc.
 - c. Oversees and performs laboratory tests on soil samples; drafts profiles of acquired data; and calculates, records, and files test results obtained from each soil horizon.
 - d. Organizes and conducts field investigations for research projects and problem areas during and prior to construction of transportation projects.
 - e. Conducts in-place surfacing investigations to determine quantities of salvageable materials.
 - f. Collects data and maintains ongoing records of pavement conditions using specialized equipment, and reports findings to managers.
 - g. Investigates material properties on problem pavements, and reports on results.
 - h. Maintains drilling equipment, and makes innovative field repairs.
3. Prioritizes and schedules tests on material samples, and ensures tests are performed in accordance with American Standards of Testing Materials (ASTM) and American Association of State Highway and Transportation Officials (AASHTO) testing standards.
- a. Receives samples and records data submitted with samples, clarifies sample data with Area Engineers when necessary, and prioritizes and documents samples.
 - b. Supervises and performs tests, ensures proper testing methods and procedures are followed for each type of sample, and that tests are conducted in a timely way.
 - c. Compiles and calculates test results and determines whether samples meet specifications and special provisions; and notifies appropriate staff and managers of failing test results.
 - d. Ensures documentation of tests is accurate and complete, and retained in permanent files.
 - e. Compiles and evaluates all test results performed on each sample for compliance with standards and special provisions, and prepares reports of results for managers and those who submitted samples.
 - f. Keeps current on all testing procedures in accordance with AASHTO, ASTM, National Institute of Standards and Technology (NIST), and other established procedures; incorporates changes in testing procedures and material specifications into acceptance procedures; and assists in development or revision of specifications.
 - g. Sets up and performs research tests, including ordering necessary equipment and supplies, and evaluates viability of new products.
 - h. Performs tests on federal proficiency samples.
 - i. Works with other laboratory managers to prepare and judge mix design trials.
4. Conducts plant inspections and material testing to determine acceptance of various materials and products used in highway project development and construction.
- a. Operates, maintains, and provides training to others in the use of specialized equipment to test specific materials and products.
 - b. Tests materials and products at plant sites, tabulates data and issues results and product release dates to field office and suppliers; notifies suppliers of failing tests.
 - c. Maintains a data base of materials and products tested and accepted for highway construction, and prepares an approved products list.
 - d. Performs research and tests on new products, tests products in construction scenarios and does follow up inspections, and writes specifications.
 - e. Performs acceptance tests on many miscellaneous materials submitted to the laboratory by field staff, and keeps computer records of sample reports.
 - f. Provides an annual report of products used to provide supporting data which is used in the purchasing process.

- g. Tests materials in place to evaluate condition and determine levels and effect of chloride contamination.

5. Performs other work as assigned.

D. Reporting Relationships:

Reports to a supervisory engineer. Does not supervise but provides work direction in a specific area of materials to other technicians and other staff.

E. Challenges and Problems:

Challenged to ensure construction materials and products are sampled, tested, evaluated, and recorded in compliance with state and federal guidelines, e.g., AASHTO, ASTM, Cement and Concrete Reference Library (CCRL), AASHTO Materials Reference Library (AMRL), Strategic Highway Research Program (SHRP), the National Institute of Standards and Technology (NIST), etc. This is challenging because of the variety and diversity of regulations, and the equally diverse amounts and types of materials to be tested; every sample must be tested with the correct procedures and equipment, and evaluated by the appropriate criteria to be validated effectively; and testing requirements and processes change frequently which requires constant attention and research. Further challenged to prioritize for processing large numbers of samples from large numbers of projects in order to facilitate rather than delay construction processes.

Problems include maintaining laboratory equipment to exact standards with constant use, incorporating research projects into schedules, scheduling plant inspections without disruption to plant operations, balancing equipment needs with available funds, unclear or incomplete sample data, and repairing equipment in the field.

F. Decision-making Authority:

Decisions include the priority and schedule of tests; whether samples submitted need corrective action taken; tests needed to ensure that the material is actually what is specified and will perform the required function; whether or not tested materials should be accepted; recommendations for specifications and the research needed to support the recommendations; the contents of the laboratory inventory, and the timing of purchases; when to replace equipment; when and how many tests to perform in pavement condition evaluations; location and depth of test holes and whether they are adequate to represent all soil horizons, and the number of soil samples to take; changes in testing procedures; recommendations for concrete design mixes; and whether contractors' equipment meets requirements and whether or not they can use it.

Decisions referred include how to follow up on failing tests; whether or not additional site inspections should be performed; the need for further expertise in testing policies and procedures; clarification of testing policies; project priorities; authorization of overtime; approval of equipment purchases and the timing of the purchases; results of research tests; final decisions on design mixes; and final approval of budget requests.

G. Contact with Others:

Daily contact with region and area personnel, other state agencies, private contractors, and personnel from other laboratories to discuss tests needed and results of tests run on samples; weekly contact with research staff to discuss research assignments and results of research tests; monthly contact with suppliers of commercial products to organize plant inspections and testing; annual contact with product manufacturers who are awarded annual contracts; and with ASTM and AASHTO laboratory inspectors regarding quality assurance laboratory inspections; and frequent contact with landowners for entry into their property for the purpose of drilling and collection of material samples.

H. Working Conditions:

Works in a laboratory setting and is exposed to high heats and hazardous chemicals used in testing some samples; lifts 50 to 100 pound samples routinely; must wear protective gear such as chemical and dust filter masks, goggles, hearing protection, rubber boots and gloves; works with mechanical, electrical, and hydraulic equipment; works outdoors, sometimes in heavy construction areas or around traffic, sometimes in adverse weather conditions, around drills and augers; works in remote rural areas as well as city traffic; and travels frequently.

I. Knowledge, Skills, and Abilities:

Knowledge of:

- construction materials and procedures;
- standards for material and product testing and evaluation;
- operation and maintenance of specialized equipment pertinent to materials testing;
- fiscal and personnel practices;
- quality assurance requirements.

Ability to:

- interpret and implement state and federal laws, policies, procedures, and standards in a wide variety of sampling and testing activities;
- organize and prioritize a heavy work load;
- communicate information clearly and concisely;
- interpret and apply material specifications and recommend revisions and updates;
- perform mathematical calculations accurately;
- lift 50 to 100 pounds routinely;
- provide training and work direction to other technicians and monitor and correct their work;
- operate a computer and use record-keeping software such as Excel.