



Technician Certification Policy

Office of
Materials and Research

Revised April 2008



Table of Contents

Introduction, Purpose, and Programs	3
Introduction	3
Purpose of the Certification	3
Technician Certification Programs.....	3
Field Technician Certification Programs.....	4
Technician Certification:	4
Reciprocal Certification:.....	5
Suspended or Revoked Certification:	5
Technician Recertification:.....	5
Math Certification (SCDOT Personnel Only):.....	6
Special Technician Certification and Recertification Requirement:.....	7
Release of Grades:.....	7
Retests:	7
Replacement Cards:.....	7
Contacts:.....	8
Course Requirements and Prerequisites.....	9
Nuclear Gauge Safety Training Program.....	9
Earthwork and Nuclear Gauge Technician Certification	9
Foundations Technician Certification.....	9
Portland Cement Concrete Technician Certification	9
Coarse Aggregate Technician Certifications.....	10
Asphalt Technician Certifications.....	11
Field Welder Certification.....	12
Attachment A.....	i
Policy for Required Experience for SCDOT Technician Certification	i
Attachment B.....	iv
Application for SCDOT Technician Certification.....	iv
Attachment C.....	vi
Detailed Requirements for HMA Technician Certification	vi

Introduction, Purpose, and Programs

Introduction

The technician's competency and certification is a viable aspect of the South Carolina Department of Transportation's (SCDOT) construction process. Without the proper training and certifications, technicians are not fully prepared to test and inspect materials for the SCDOT.

Purpose of the Certification

The purpose of the technician certification policy is to assure the proper qualifications of all technicians that participate in the SCDOT testing and inspection of materials through set procedures and guidelines. The certification policy provides the necessary requirements of certification needed for the technician to properly and accurately perform tests and inspections in accordance with the required procedures. The use of certified technicians is designed to improve the consistency and quality of both laboratory and field test results.

Technician Certification Programs

There are two groups of certifications provided by the Department. These include technician field certifications and technician laboratory certifications. The technician field certification program falls under the direction of the Technician Certification Board. The certification Board was empowered by the State Highway Engineer on April 4, 1994 to investigate and act on all matters, issues and controversies pertaining to the QC/QA programs. This board is composed of 9 members, including the Director of Construction, the Materials and Research Engineer, a representative from the Department's Legal section, a District Engineering Administrator (2 year rotation), the Bridge Construction Engineer, the State Materials Engineer, the State Pavement Design Engineer, the Technician Certification Program Liaison, and a representative of the FHWA. The Technician Certification Program Liaison and the representative from the FHWA are ex-officio members.

Field Technician Certification Programs

General Information

Technician Certification:

Field technician certifications are required for all personnel testing or inspecting construction projects. This certification requirement applies to SCDOT personnel, all contractor personnel, and all consultant personnel performing testing or inspection on SCDOT construction projects or Design/Build construction projects. Clemson University and the University of South Carolina administer the technician field certification programs with the exception of the Field Welder Certification. The following technician certification programs are offered:

Clemson University 

Website: www.ces.clemson.edu/scdotcert

- Asphalt (HMA) Technician Certification
- Earthwork and Nuclear Gauge Technician Program
- Nuclear Gauge Safety Certification
- Foundations Certification

University of South Carolina 

Website: www.ce.sc.edu/scdot

- Portland Cement Concrete Technician Certification
- Coarse Aggregate Technician Certification (Administration)

South Carolina Department of Transportation 

- Field Welder Certification
- Math Certification
- Coarse Aggregate Technician Certification (Instruction)

These certifications, with the exception of the Nuclear Gauge Safety Training Program and the Field Welder Certification, are five-year certifications. The Nuclear Gauge Safety Training Program is a three-year certification due to Federal regulations. The Field Welder Certification is a two-year certification. Each certification course includes attending class, receiving a new course book (even if one was received in the past), receiving food if offered, and taking one free exam.

For the programs offered at Clemson University and the University of South Carolina, each technician is required to have at least 6 months of experience in the area in which they are seeking certification. Those seeking recertification are required to provide their certification number in order to waive the experience requirement. For more information concerning this requirement, please refer to the *Policy for Required Experience for SCDOT Technician Certification* prepared by the SCDOT Technician Certification Board and included as [Attachment A](#) of the *Technician Certification Policy*.

All technician certification courses are open to any qualified candidate. Each year, Clemson University and the University of South Carolina will decide the number of courses to be offered during the following year. If at any time during the year, the waiting list for a specific course is equal to or more than the maximum number of participants for that course, efforts will be made to schedule additional courses. The participants for these courses are based on a “first come, first served” basis determined by the waiting lists that are held by Clemson and the University of South Carolina.

Reciprocal Certification:

Acceptance of SCDOT Certification by other state agencies is at the sole discretion of the other agency. SCDOT will not accept other agency’s certification toward the Department’s technician certification program.

Suspended or Revoked Certification:

Certification is deemed to be a privilege that has been earned by an individual. This privilege can be suspended or revoked at any time if, in the opinion of the Technician Certification Board, an individual is thought to have knowingly committed acts that are detrimental to the integrity of the Certification Program or the industry in general. Acts that may result in suspension or revocation of certification include, but are not limited to, the following:

- falsification of field or quality control tests results and/or records
- submitting false information that can be used for field or quality control test results
- failure to perform specified duties
- display of any dishonest behavior during certification or re-certification exams
- unreported knowledge of wrong doing by other technicians

Technician Recertification:

Technician recertification for Earthwork and Nuclear Gauge Technician Program, Foundations Certification, Asphalt HMA Technician Certification, PCC Technician Certification, and Coarse Aggregate Technician Certification is required every five

years. Nuclear Gauge Safety Certification is required every 3 years, and Field Welder Certification is required every 2 years. With the exception of the Asphalt HMA Technician – Level 3: Quality Control Manager Course and Earthwork and Nuclear Gauge Technician course, recertification requires full completion of all prerequisites and the certification course.

Although the administering universities will inform individuals, by way of a letter mailed to the technician's last address of record, when the certification period is nearing the expiration date, it is the responsibility of the individual to keep the universities advised of the current address and to reapply and then attend each recertification course as necessary.

Technicians are advised to monitor their certification expiration dates and attend the appropriate recertification course within one year prior to each certification's scheduled expiration date to allow for cancelled classes, full classes, etc. *Certification expiration dates for recertifications obtained within one year prior to the technician's original date of expiration will be issued based on the original expiration date.* For example, if a technician's certification expires August 2008, and that technician passes a recertification exam in August 2007, his/her certification will be extended five years from the original August 2008 date to August 2013. However, if that technician chooses to attend the recertification class in July 2007, and passes the exam, the recertification will be valid from July 2007 to July 2012 because the technician passed the exam *outside of the one-year window.* If that technician does not obtain the recertification before August 2008, then his/her certification expires on that date.

Asphalt HMA Technician – Level 3: Quality Control Manager recertification is a comprehensive course that includes review and technical competency through written examination of Levels 1,2S, ART, and Level 3. Therefore, those technicians previously certified in Level 3 will not be required to attend Levels 1, 2S, and ART prior to taking the recertification course.

Math Certification (SCDOT Personnel Only):

In order to establish a minimal level of competence in basic math skills, all SCDOT employees desiring to attend one of the Department's inspector certification schools will be required to pass a one-time math proficiency exam (see exemptions below). It is the intent of this certification to provide the certification school instructors a pool of Department employees who are capable of solving key mathematical problems as they relate to their technically oriented duties. The quality of instruction and learning is greatly enhanced when the instructors are able to concentrate on specific job-related issues instead of teaching basic mathematical concepts.

The math certification requires attending a short refresher class and taking a Department exam administered by the Office of Materials and Research. Those employees who do not pass this exam will be required to re-take the math

certification class at another time (classes are typically offered several times each year). When the Districts submit applications for their employees to attend the technician certification schools, the application is to include the math certification status, or reason for exemption, for each applicant submitted. There is no expiration date for math certification. Employees do not have to be math certified to attend recertification courses.

Exemptions include the following:

- Employees with a minimum of two years attendance at a university, college, or technical school, or
- Employees who have previously been certified in any of the Department's construction certification areas (Earthwork and Nuclear Gauge, Foundations Technician, Asphalt Technician, Concrete Technician, or Aggregate Technician). For example, an employee who was certified previously as an earthwork technician would not have to be math certified in order to attend the concrete school.

Special Technician Certification and Recertification Requirement:

Each technician is required to complete an *Application for SCDOT Technician Certification*. The purpose of this application is to make technicians aware of rules and regulations regarding the rights and responsibilities of becoming a certified SCDOT technician. Please refer to [Attachment B](#) of the *Technician Certification Policy*, visit either university website, or the SCDOT website at: <http://www.scdot.org/doing/InspectorCertification.shtml>.

Release of Grades:

Each university requires that the release of any grade be made only to the attendee of the certification course regardless of payer.

Retests:

Re-tests are permitted for any technician that fails an exam but scores 60% or higher. The re-test of any exam must be completed within 60 days of notification of failing. For all certification courses offering an exam re-test, only one exam re-test is allowed and a fee of \$50.00 will be charged. If a participant fails the re-test or scored below 60% on an exam, full course attendance at the full course fee is required in order to continue pursuit of a certification.

Replacement Cards:

Replacement cards may be obtained from the appropriate university for a fee of \$10.00. Habitual loss of cards will be dealt with on a case-by-case basis.

Contacts:

In order to attend any of these certification courses, please contact the following:

<u>Course</u>	<u>Contact</u>
Foundations, HMA, Earthwork and Nuclear Gauge*	Ms. Myrtle Mraovich mmyrtle@ces.clemson.edu Clemson University 864-656-4183
Coarse Aggregate Level I and II, SCDOT Concrete, Math testing for SCDOT Concrete Certification (non-SCDOT employees)	Ms. Jill Sweeney sweeneyj@enr.sc.edu University of South Carolina 803-777-3614
Concrete Field Testing Technician, Grade I	American Concrete Institute (ACI) 704-588-9601
Welding Certification	Mr. Mike Koon koonme@scdot.org SCDOT Office of Materials and Research 803-737-6698
Math Certification (SCDOT employees)	Dr. Aly Hussein, PE huseinaa@scdot.org SCDOT Office of Materials and Research 803-737-6687

If you need assistance other than for registration of courses, please contact the following person:

SCDOT Technician Certification Program Liaison
Ms. Temple Short
shorttk@scdot.org
Office of Materials and Research
803-737-6648

Course Requirements and Prerequisites

Where applicable, the tests covered in the certification course or those that are required prior to the course, as indicated, are listed.

Nuclear Gauge Safety Training Program

49CFR 172, Subpart H - Nuclear Gauge Safety Training Program

Earthwork and Nuclear Gauge Technician Certification

Must have 6 months related experience. See *Policy for Required Experience for SCDOT Technician Certification* prepared by the SCDOT Technician Certification Board and included as [Attachment A](#).

SC-T-22 Moisture Content Carbide Gas Method

SC-T-33 Nuclear Gauge Density and Moisture

SC-T-29 One Point Proctor Method

Foundations Technician Certification

Must be SCDOT Portland Cement Concrete certified and have 6 months related experience. See *Policy for Required Experience for SCDOT Technician Certification* prepared by the SCDOT Technician Certification Board and included as [Attachment A](#).

Portland Cement Concrete Technician Certification

Completion of **both** the written portion of the SCDOT Portland Cement Concrete Technician Certification program offered by the University of South Carolina and ACI are required for Portland Cement Concrete Technician Certification. Technician must also have 6 months related experience. See *Policy for Required Experience for SCDOT Technician Certification* prepared by the SCDOT Technician Certification Board and included as [Attachment A](#).

Prior ACI is not required in order to attend the written portion of the SCDOT Portland Cement Concrete Technician Certification program offered by the University of South Carolina. However, those technicians not providing proof of ACI within 1 year of successful completion of the written portion of the SCDOT Portland Cement Concrete Technician Certification at the University of South Carolina will be required to retake the course in order to continue seeking Portland Cement Concrete Technician Certification.

Written Portion of the SCDOT Portland Cement Concrete Technician Certification

Technicians need to be very familiar with SCDOT PCC specifications and batching requirements, such as completion of SCDOT Form 700.04 (formerly known as the 660 form).

ACI Certification

ASTM C-1064 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

ASTM C-138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

ASTM C-31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C-172 Standard Practice for Sampling Freshly Mixed Concrete

ASTM C-143 Standard Test Method for Slump of Hydraulic-Cement Concrete

ASTM C-173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C-231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

Coarse Aggregate Technician Certifications

No prerequisites are required. However, handling and testing experience are strongly encouraged.

Level 1

AASHTO T-2 Sampling of Aggregates

AASHTO T-27 Sieve Analysis of Fine and Coarse Aggregate

AASHTO T-248 Reducing Field Samples of Aggregate to Testing

Level 2 – Must complete Level 1 prior to this class.

AASHTO T-85	Specific Gravity and Absorption of Coarse Aggregate
AASHTO T-96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T-104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
AASHTO T-176	Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
SC-T-77	Method for Determining Flat and Elongated particles in Coarse Aggregate

Asphalt Technician Certifications

In addition to any prerequisite indicated below, the technician must also have 6 months related experience. See *Policy for Required Experience for SCDOT Technician Certification* prepared by the SCDOT Technician Certification Board and included as [Attachment A](#). For additional information concerning HMA QC/QA certification, please refer to *Detailed Requirements for HMA Technician Certification* included as [Attachment C](#).

Asphalt Roadway Technician Course (ART) - Certification in Nuclear Gauge Safety is required for SCDOT employees only before attending this course.

Level 1: HMA Quality Control Technician Course

Experience Needed Prior to Level 1

SC-T-1 & SC-T-2 Aggregate Sampling

SC-T-66	Field Determination of Stability of Hot Mix Asphalt Mixtures by Marshall Method
SC-T-68	Determination of Percent Air Voids in Mineral Aggregate in Compacted Marshall Specimens
SC-T-75	Determination of Asphalt Binder Content for Asphalt Paving Mixtures by the Ignition Oven
SC-T-76	Determination of Washed Aggregate Gradation of Hot Mix Asphalt Extracted Aggregates
SC-T-83	Determination of Maximum Theoretical Specific Gravity

Level 2S: HMA Job Mix Technician Course – Must have successfully completed the Level 1 course.

Level 3: Quality Control Manager Course – Must be Levels 1, 2S, and ART certified.

Field Welder Certification

Field Welder Certification is obtained in accordance with the most current edition of the South Carolina Department of Transportation's Standard Specifications for Highway Construction. Certification involves being tested and approved by an independent laboratory listed on Qualified Product Listing 26, "Independent Testing Labs Qualified to Administer Field Welding Tests to Certify Field Workers for SCDOT Field Welding" and then having the qualification information forwarded to the Materials and Research Engineer. Each Welder will be issued an SCDOT Certification and assigned a unique lab number by the Materials and Research Engineer.

Attachment A
Policy for Required Experience for SCDOT Technician Certification

**Policy for Required Experience for SCDOT Technician
Certification
SCDOT Technician Certification Board
April 2008**

General

SCDOT Technician Certification Courses are designed to provide a relatively brief overview of a particular subject such as HMA testing, concrete placement, drilled shaft installation, etc., and then test the attendee's competency in that particular subject. The courses are not intended to be training courses. Attendees typically include SCDOT personnel, contractor personnel, and consultant personnel. They are expected to have sufficient knowledge and experience in the subject matter before attending the course and becoming certified.

These requirements apply to the certification courses in HMA (ART, Level 1, and Level 2s), PCC, Earthwork & Base Course, and Foundations Inspection.

Required Experience

Certain courses have prerequisites, such as a current certification in another area, which must be satisfied before attending the course. In addition to these individual requirements for each course, candidates for any technician certification course must also have field experience in the particular subject area in which they are seeking certification.

All technician certification applicants must have at least 6-months of documented experience in the same area that they are seeking certification.

Additionally:

- The experience must be obtained and documented prior to attending a particular course;
- The experience must be documented on the appropriate forms;
- The forms must have the applicant's signature as well as the signature of a person already certified in that area who can attest to the applicant's experience level (in the case of HMA, a Level 3 may sign for Level 1, 2s, and ART certifications);
 - *Note: If it is determined later that an applicant did not actually obtain the experience listed, that person, along with the person who signed the form, will be subject to investigation for falsification of records. Persons caught falsifying records may have their certification revoked.*
- The completed experience forms must be submitted to the appropriate course administrator (Clemson University or the University of South Carolina) at least one (1) month prior to the class.
 - *Note: Applicants without the appropriate experience forms submitted by the deadline will have their class space forfeited.*

Waivers for Experience

Waivers for experience will only be considered under extenuating circumstances.

A waiver may be granted so that an applicant may attend a certification class without having proof of 6-months experience. Any waivers issued will only pertain to the 6-months experience requirement and will never include exemption of other certification requirements such as class attendance, exam completion, etc.

Additionally:

- SCDOT personnel are not eligible for waivers,
- Waiver requests must come in writing from a company official, accompanied by copies of all necessary and relevant documentation (i.e., NICET certificate, ACI certificate, etc.),
- Waiver requests are to be sent to the appropriate certification task force chairman as indicated below,
- The task force chairman has the sole discretion concerning the issuance of any waiver,
 - Waivers may be denied, issued for part of the experience requirement, or issued for the entire 6-month requirement,
 - The decision of the task force chairman concerning issuance of a waiver is final and there is no appeal process,
 - Decisions on waiver requests will be made within 15 days of receiving the request.

Send any waiver requests to SCDOT, P.O. Box 191, Columbia, SC 29202, Attention:

<u>Certification</u>	<u>Task Force Chairman</u>	<u>Title</u>
Hot Mix Asphalt (all)	Merrill Zwanka, PE	State Materials Engineer
Portland Cement Concrete	Merrill Zwanka, PE	State Materials Engineer
Earthwork and Base Course	Andrew Johnson, PE	State Pavement Design Engineer
Foundation Inspection	Charles Matthews, PE	Bridge Construction Engineer

Implementation

This policy has been developed by the SCDOT Technician Certification Board and is effective April 1, 2008 with the appropriate certification programs.

Attachment B
Application for SCDOT Technician Certification



April 25, 2007

APPLICATION FOR
SCDOT TECHNICIAN CERTIFICATION

This is to affirm that _____ (Technician's Name), hereinafter "Technician," desires to be certified by the SCDOT as a (an) _____ (Name of Certification desired). By making this Application, Technician acknowledges and agrees that Certification carries inherent rights and responsibilities. The rights include being exclusively sanctioned, along with others so certified by SCDOT, to perform sampling, testing, and reporting of test results for quality acceptance, quality control and assurance programs. The responsibilities include performing and reporting tests with the accuracy and precision expected of the Technician in accordance with the required test procedures.

By signing this Application, Technician agrees to strict compliance with all laws, rules, regulations, specifications, industry standards, procedures, policies, and guidance, applicable to any work performed under the Certification. Any determination by the SCDOT Technician Certification Board of either a willful or negligent violation thereof, including an omission or failure to act, may result in a suspension or revocation of the rights and responsibilities conferred on the Technician upon issuance of the Certification, whether or not any erroneous results were obtained. A negligent violation is defined as an unintentional act or omission in which Technician fails to exercise due care. A willful violation is defined as an intentional act or omission. Revocation or suspension of one Certification may result in a revocation or suspension of any additional Certifications held by the Technician. Revocation of Certification(s) may result in Technician being ineligible for any future SCDOT Certifications for a period of time to be determined by the Technician Certification Board. Further, any suspension or revocation of Technician's Certification in any other jurisdiction may result in the SCDOT Technician Certification Board taking the same, or other action, against Technician's Certification in South Carolina.

Please answer the following questions:

1. _____ Yes or No: Do you currently hold, or have you held in the past, a Technician Certification in any other state? List states in which you are Certified: _____
2. _____ Yes or No: If you answered "yes" to question No. 1, have you ever had a Technician Certification revoked or suspended? *

** If you answered "yes" to question No. 2, provide on a separate page a brief explanation of the reason for the action against the Certification, current status of that Certification, and in what state the Certification is/was held. Note: Approval of SCDOT Certification is contingent upon SCDOT Technician Certification Board action.*

By signing below, Technician also affirms that he/she is aware that both State and Federal laws may govern construction projects in South Carolina, including Title 18, United States Code, Section 1020, that states, in pertinent part, that anyone making falsifications on Federal-aid projects,

"Shall be fined not more than \$10,000 or imprisoned not more than five years, or both."

I, _____ (Print Name), affirm that I have read and fully understand the foregoing "APPLICATION FOR SCDOT TECHNICIAN CERTIFICATION," and I agree to be bound by these terms.

Technician's Signature: _____ Date: _____

Attachment C
Detailed Requirements for HMA Technician Certification

***Detailed Requirements
for
HMA Technician Certification***

Presented by:

***South Carolina Department of Transportation
and
Clemson University***



South Carolina Department of Transportation



Table of Contents:

	Page
Chapter 1 - Construction Training and Qualification Procedure	1
Chapter 2 - Asphalt Roadway Technician (ART) Requirements	3
Chapter 3 - Level 1: HMA Quality Control Technician	5
Chapter 4 - Level 2S: HMA Job Mix Technician	7
Chapter 5 - Level 3: HMA Quality Control Manager	9
Chapter 6 - Technician Re-certification Requirements	11
Appendix Course Qualification Table	12

Chapter 1 - Construction Training and Qualification Procedure

1.1 Introduction

Statistical quality control and assurance (QC/QA) programs, in general, have contributed significantly to the production of more consistent, higher quality hot mix asphalt (HMA). In order to conduct a viable quality control / quality assurance (QC/QA) program there must be qualified technicians working for both the contractor and highway agency. Contractor's technicians must have the knowledge and experience to carry out the daily quality control and acceptance operations while agency technicians need to have the proper background to assure that the contractors are properly conducting their QC/QA program. All HMA technicians need to be properly trained in specifications, test procedures, and industry standards.

To accomplish the task of assuring qualified technicians on Department projects, a HMA technician certification program was developed by the South Carolina Department of Transportation, Asphalt Paving Industry, and the Federal Highway Administration. The Clemson University Civil Engineering Department administers the HMA technician certification program.

1.2 Purpose of the Certification Program

The purpose of the HMA Technician Certification program is to assure the proper qualification of all technicians that participate in the SCDOT HMA QC/QA program. The use of certified technicians is designed to improve the consistency and quality of both laboratory and field test results on projects that are funded by the agency. In addition, another objective is to improve cooperation between the SCDOT and the industry. The end result of this program should improve paving quality therefore resulting in overall cost savings and longer lasting pavements.

The SCDOT's regulations indicate that contractors or consultants involved with any DOT project must have certified technicians perform the duties that are required of them. Therefore, no other certifications will be accepted from other states or agencies. The main reason for this criterion is that the SCDOT procedures, like procedures in many other states, are unique to South Carolina and technicians must be familiar with the state's specifications. Due to these regulations, the Technician Certification Board and Task Force were formed to ensure the quality of the QC/QA program and that all technicians adhere to regulations.

1.3 Certification Board and HMA Technician Certification Task Force

The South Carolina Certification Board is composed of nine members. Eight of the members are representatives from the Department while the ninth member is a representative from the Federal Highway Administration (FHWA). The member from the FHWA is an ex-officio member. The Certification Board was empowered by the State Highway Engineer on April 4, 1994 to investigate and act on all matters, issues and controversies pertaining to the QC/QA programs. The Board acts as necessary for the technician certification program to operate smoothly and equitably.

The HMA Technician Certification Task Force is composed of representatives from SCDOT, the Asphalt Paving Industry, FHWA and Clemson University. The primary purpose of this group is to develop and update HMA technician certification requirements as necessary, plan yearly HMA technician certification courses and address matters pertaining to the HMA Technician Certification program.

1.4 HMA Technician Certification Program Administration

Dr. Serji Amirkhanian at Clemson University is the HMA Technician Certification Coordinator. He is responsible for scheduling the SCDOT certification courses and making all of the necessary arrangements for course materials and instructors. Clemson University administers the tests and maintains all records for certification and re-certification. They are responsible for sending out announcements of courses that are to be offered and reminders to technicians that are due to be recertified. It should be noted that it is the technician's responsibility to keep up with his or her certification.

Anyone interested in attending the HMA technician certification courses should contact Dr. Serji Amirkhanian or Ms. Myrtle Mraovich at 864-656-4183.

1.5 Technician Certification Programs

There are four levels of HMA technician certification. The four levels are as follows:

- Asphalt Roadway Technician (ART),
- Level 1: HMA Quality Control Technician,
- Level 2S: HMA Job Mix Technician, and
- Level 3: HMA Quality Control Manager.

Chapter 2 - Asphalt Roadway Technician Requirements

2.1 Required Work Experience

It is required that any individual wishing to become certified as an Asphalt Roadway Technician (ART) shall have 6 months of asphalt roadway experience. This experience should include some knowledge of paving equipment, including the paver and rollers, as well as the techniques used in laying and compacting HMA. They should also have experience with compacting and sampling roadway mixtures, calculating tack and mix rates, and an understanding of SCDOT specifications. For SCDOT personnel, completion of the nuclear density gauge safety-training course is a prerequisite for the ART course. An SCDOT participant MUST provide certificate of completion of this safety course at the time of registration.

2.2 Certification Requirements

Upon completion of the Asphalt Roadway Technician course, each participant should have knowledge of and be able to demonstrate all topics listed in Table 1. Participants are required to take and successfully pass a written exam with a score of 80% or higher to complete the course.

Table 1 – Some of the Roadway Technician Course Topics

Responsibilities of the Roadway Technician
Safety Concerns
Paving Equipment (Distributors, Pavers and Rollers)
Asphalt Pavement Construction
Application of tack coats / calculation of rate
Spreading of asphalt mixes / calculation of rate
Materials: Binder, Aggregates, and Tack coats
Troubleshooting- Tack rates, mix rates, etc.
Segregation
Pavement Evaluation
Random Sampling and Compaction
Control Strips
Effects of Mix Design and Plant on Performance of Mix in the Field
Troubleshooting- Group discussion of Roadway Problems
SCDOT Specifications
Use of Density Gauge

2.3 Course Description

The Asphalt Roadway Technician Course is intended to assure competency in proper testing procedures and everyday field tasks. The participants are required to perform mathematical problems that occur while working as a roadway technician. The learning experience is dependent on the level of prior experience and may differ between participants. However, the goal is the same: to establish a consistent understanding of roadway inspection.

The Asphalt Roadway Course typically starts on Monday morning. The classes are conducted on an informal basis, with casual dress. The instructors for the classes are made up of knowledgeable asphalt industry consultants, equipment manufacturers, academia, contractors and SCDOT representatives. Each participant is responsible for solving various roadway problems. Some sample problems may deal with tack rate, compaction, asphalt mix rate, and control strips. Participants are encouraged to work together as a team, however, the students are responsible for solving problems individually later on the written examination. The solutions for all problems are worked throughout, and discussed fully in the classroom.

2.4 Description of Work

Individuals that complete the course will be certified to perform Asphalt Roadway Technician duties on SCDOT projects. Some of the responsibilities of an Asphalt Roadway Technician are as follows:

- Establish and monitor roller patterns,
- Monitor ambient air temperature,
- Monitor mat temperature,
- Calculate tack rate and dilution rate,
- Calculate lay down rate, and
- Monitor compaction with density gauge.

Chapter 3 - Level 1: HMA Quality Control Technician

3.1 Required Work Experience

Any individual wishing to become certified as a Level 1: HMA Quality Control Technician is required to have 6 months of asphalt field laboratory experience. During that time, the individual should acquire some knowledge of aggregate and asphalt mix testing and all calculations pertaining to those subject matters.

3.2 Certification Requirements

Upon completion of the HMA Quality Control Technician course, each participant should be able to demonstrate competency in all topics listed in Table 2. Participants are required to take and successfully pass a two-part exam, an oral exam (50% of total grade) and a written exam (50% of total grade) with a combined score of 80% or higher, to complete the course. Participants must score at least 80% on each section of the test (oral and written) to pass the course.

Table 2 – Some of the HMA Quality Control Technician Course Topics

Responsibilities of HMA QC Technician
Aggregates: SC Aggregate Types; Physical Properties; Sieve Analysis; Testing Procedures; Specific Gravities; Sampling; Introduction to Blending
Binder: PG Grading; Physical Properties; Sampling; Safety
HMA Mixtures and Introduction to Job Mix Formula Preparation
SCDOT Specifications
Sampling
Potential Problems with Mixes
Rice Gravity, Air Voids, % VMA, % VFA, Stability, TSR
Importance of Hydrated Lime
Ignition Oven Testing & Calibration

3.3 Course Description

The HMA Quality Control Technician Course is intended to ensure an understanding of the proper testing procedures and requirements for asphalt plant inspection. All participants in this class are expected to have some laboratory experience at the asphalt plant, and should be familiar with the related SCDOT specifications. The course serves as a guide for quality control technicians to learn laboratory testing methods used by the SCDOT. The asphalt plant technician will

be expected to perform these tests, and demonstrate competency of testing procedures individually.

The course will typically begin on Monday morning. The classes will be conducted on an informal basis, with casual-working dress. This course is usually divided into two parts - a morning lecture session, and an afternoon laboratory session. During the laboratory session, the class is divided into subgroups of three or four students. The groups work together as teammates for the entire week. They perform laboratory procedures simulating actual working conditions at the asphalt plant. After demonstrating the procedures, the students are required to prove their own individual capabilities. On the last day of class, an oral test of knowledge of laboratory testing procedures is given, along with a written examination. The written portion of the examination is open book and notes while the oral portion is closed book and notes.

3.4 Description of Work

Individuals that successfully complete the HMA Quality Control Technician course will be certified to work on SCDOT projects as a HMA Quality Control Technician. The responsibilities of a HMA Quality Control Technician include:

- Perform stockpile and mixture gradations,
- Perform Maximum Specific Gravity tests on HMA mixtures,
- Verify lime rate,
- Verify mixture temperature,
- Perform binder content analysis using the Ignition Oven,
- Calculate mixture volumetric properties, and
- Other testing as required for adequate quality control.

Listed in Table 3 are laboratory test methods that may be required in the quality control of HMA mixtures.

Table 3: Quality Control Technician Laboratory Procedures

AASHTO OR SCDOT (ASTM DESIGNATION)	TITLE
T-248, SC-T-1, SC-T-2, SC-T-62, (C 702)	Reducing Field Samples of Aggregate to Testing size.
T-27, SC-T-3, SC-T-4, (C 136)	Sieve Analysis of Fine and Coarse Aggregates
T-11, (C 117)	Materials Finer Than No. 200 Sieve in Mineral Aggregates by Washing
T-209, SC-T-83, SC-T- 87, (D 2041)	Maximum Specific Gravity of Bituminous Paving Mixtures
T-166, SC-T-68	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
SC-T-75, SC-T-76	Extraction and Gradation Using the Ignition Oven

Chapter 4 -Level 2S: HMA Job Mix Technician

4.1 Required Work Experience

Individuals that attend the Level 2S HMA Job Mix Technician course are required to have 6 months of Job Mix Formula (JMF) preparation experience. During that time, the individual should acquire some knowledge in aggregate and asphalt mix testing, asphalt mix design, and the calculations pertaining to those subject matters. The technician must be familiar with the gyratory compactor. Technicians must have successfully completed the Level 1 HMA Quality Control Technician Course prior to taking the Level 2S class.

4.2 Certification Requirements

Upon completion of the HMA Job Mix Technician course, each participant should be able to demonstrate all topics listed in Table 4.

Table 4: Some of the HMA Job Mix Technician Topics

Introduction & Background
Aggregates: LA Abrasion; Coarse & Fine Aggregate Angularity; Flat & Elongated Particles; Clay Content; Soundness; Deleterious Materials
Binder: PG Grading; Physical Properties; Safety
Volumetric Properties: Bulk and Maximum Gravity, Air Voids, % VMA, % VFA
Calibration of Gyratory Compactor: Angle; Pressure; Height; Rotation
Volumetric Mix Properties: Materials; Aggregate Structure; Binder Content; Moisture Susceptibility
SCDOT Specifications

Participants are required to take and successfully pass a written exam with a score of 80% or higher to complete the course. Upon satisfactory completion, the participants must attend a three-day session at the Office of Materials and Research in Columbia, South Carolina to demonstrate the JMF Preparation procedures. This must be done within sixty (60) days of receiving notice of passing the written exam. Next, the individual must enroll in the AASHTO Materials Reference Laboratory (AMRL) HMA Marshall Design and/or HMA Gyratory program, as applicable, for at least one cycle.

In order to be eligible to submit JMFs for approval by the SCDOT, an individual must remain AMRL certified, in the area of which the mixes are being submitted (Marshall and/or gyratory), and maintain certification as an HMA JMF Preparation Technician. AMRL certification requires each technician to complete the AMRL program each year and receive at least a three (3) rating or higher. If a two (2) rating or lower is received, the technician must explain to Dr. Amirkhanian, in full detail, the circumstances of the low rating and how the problem will be corrected. After two consecutive low ratings, the technician may be placed on probation or have their certification revoked. The results of the AMRL testing must be faxed to Ms. Myrtle Mraovich (Civil Engineering Department, Clemson University) at 864-656-0124 within 30 days of receipt.

4.3 Course Description

The participants of this course must be certified at Level 1. The mix design course is intended to cover the SCDOT and AASHTO JMF Preparation procedures. The class is divided into two sections, a laboratory session and a classroom session. The majority of the time is spent at the laboratory applying testing procedures and design techniques discussed in the classroom. The class is separated into groups, with each group being responsible for preparing their own JMF. Additional aggregate tests are performed in the laboratory to assure aggregate properties meet SCDOT guidelines.

4.4 Description of work

HMA JMF Preparation Technicians will be responsible for preparing mixes in a certified mix preparation laboratory. The laboratory must meet SC-M-405 which is to be certified by an authorized SCDOT official. The JMFs will then be submitted to the Department's HMA Unit for approval. After JMFs have been approved, the Level 2S technician will then be responsible for submitting the proper forms (Lab Form 310) to specify which mix they would like to be approved for specific projects.

Chapter 5 - Level 3: HMA Quality Control Manager

5.1 Recommended Work Experience

Individuals that attend the HMA Quality Control Manager's course should have at least two years of asphalt field laboratory experience, along with experience in Job Mix Formula preparation. During that time, the individual should acquire extensive knowledge of aggregate testing, asphalt mix testing, and JMF preparation procedures. The HMA Quality Control Manager should have an understanding of the asphalt plant and the laydown equipment and how each procedure in the production process may affect the mixes being produced.

5.2 Certification Requirements

The prerequisites for attending the Level 3: HMA Quality Control Manager's course are certification as an Asphalt Roadway Technician as well as Level 1 and Level 2S. Before completing the Level 3 course, each participant must be able to demonstrate adequate knowledge of all topics listed in Table 5.

Table 5: Some of the HMA Quality Control Manager's Course Topics

Responsibilities of HMA Quality Control Manager QC/QA Plans
Aggregates: Physical Properties; Sampling; Testing Procedures; 0.45 Power Curve; Blending; Problem Solving
Binder & HMA Mixtures: PG Grading; Mix Design; Sampling; Safety; Polymers; Problem Solving
Drum Mix Plants Batch Plants
SCDOT Specifications

This course is primarily intended for people who are in a managerial position. The HMA Quality Control Manager must be able to demonstrate the ability to maintain compliance with all requirements pertaining to the quality of asphalt mixes produced for the SCDOT. The HMA Quality Control Manager's responsibilities will include selection of aggregates, JMF preparation, monitoring the entire production and laydown process, and correcting any quality control problems that may arise.

5.3 Course Description

The course is held in a classroom setting, with no laboratory sessions. The class is divided into several sub-groups to work on troubleshooting various types of potential problems. Some of the subject matter for troubleshooting includes aggregates, asphalt plant operation, asphalt JMF preparation, compaction equipment, and laydown operations. Several experienced industry, academia, and DOT experts will be present to share their knowledge of asphalt related topics. The participants of this class must take a written final exam with a passing grade of 85% or higher.

5.4 Description of Work

The HMA Quality Control Manager will be readily available to monitor mixture production, placement and testing on each project. This individual will have been certified in all other levels and can provide insight to problems or conditions that arise during production and/or mix preparation. This person will be the Department's primary contact should problems develop during a project. The HMA Quality Control Manager should at all times be familiar with the current test results and any trends in the test data.

Chapter 6 – HMA Technician Re-certification Requirements

6.1 Frequency of HMA Re-certification

The certification period for all levels is five years. An individual will be informed, by way of a letter mailed to the technician's last address of record, when the certification period is nearing the expiration date. It is the responsibility of the individual to keep Clemson University advised of the current address. The individual is responsible for reapplying to Clemson University and attending the re-certification course and passing the written exam as outlined in this policy. If that individual cannot attend the re-certification course, that individual's certification will expire for that area after the five years have elapsed.

6.2 HMA Re-certification Requirements

To become re-certified in any of the four levels, the participant must attend a two (2) to three (3) day class and pass a written exam. This class will contain a general overview, a review of all specification changes, and any procedural changes that may have occurred. Demonstration of competency to perform the duties required at any level may be required. Re-certification is required on any level of which an individual has the potential to be performing those required tasks. For example, a Level 3 HMA Quality Control Manager cannot perform the duties of an Asphalt Roadway Technician unless he/she has been re-certified as an Asphalt Roadway Technician once his/her Asphalt Roadway Technician certification expires.

An exception to the above is when an individual has been certified or recertified in Level 3 and their certification card indicates certification in "123A." These individuals are, at the time of their certification or recertification, automatically recertified in ART, Level 1, and Level 2S simultaneously and will only be required to maintain certification in Level 3 every five years in order to perform the duties of an ART, Level 1, or Level 2S technician on SCDOT projects. However, these individuals must still adhere to the requirements contained in the body of the policy concerning AMRL proficiency samples if they will be submitting JMFs for approval.

Course Qualification Table

Qualification Level	Responsibilities and Duties	Prerequisite	Specific Tests Performed in Level (List ASTM or AASHTO or State Procedure Number)	Training Materials	Length of Qualification (Years)	Test for Initial Qualification			Test for Re-qualification		
						Written	Demonstration of Proficiency	Other Requirements	Written	Demonstration of Proficiency	Other Requirements
Level 1 - HMA QC Technician	Performs QC (Contractor personnel) and QA (State personnel) tests at the HMA plant	6 months experience required	AASHTO T2, T11, T27, T166, T209, T245, T248, T283 (SC-T-70), T308 (SC-T-75), SC-T-72	In-house class workbook	5	Yes	Yes - in class	No	Yes	Yes - in class	No
Level 2S - HMA Job Mix Technician	Prepares HMA Job Mix Formulas	Level 1 certification and 6 mos. Job Mix preparation experience required.	AASHTO T209, T248, T283, T312, ASTM D4791 (SC-T-77)	In-house class workbook	5	Yes	Yes - in class and then 3 days at SCDOT lab	Participation in AMRL proficiency sample program (Gyratory and/or Marshall)	Yes	No	Maintain satisfactory participation in AMRL prof. sample program
Level 3 - HMA Quality Control Manager	Oversight and troubleshooting of HMA mix design, production, and placement	Level 1, Level 2S and ART Certifications with recommended 2 yrs managerial experience	None	In-house class workbook	5	Yes	No	No	Yes	No	No
Asphalt Roadway Technician (ART)	Performs QC testing and inspection on the roadway on HMA paving projects	Must be certified by nuclear gauge manufacturer(SCDOT only), 6 months experience required	SC-T-84, SC-T-85, SC-T-86, SC-T-101	In-house class workbook	5	Yes	No	No	Yes	No	No