2024

North Carolina DOT Independent Assurance Program

1/1/2024

Purpose

The purpose of the NCDOT Independent Assurance (IA) Program is to assist Engineers, Technicians, and the Department in the administration of federally funded transportation projects. It provides guidance for the NCDOT oversight staff responsible for supporting this program.

FHWA Regulation 23 CFR 637 requires each state to have an IA Program and defines this as:

"Activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program."

The Independent Assurance Program ensures the sampling and testing procedures are performed correctly and the testing equipment used in the program is operating correctly and remains calibrated. It involves a separate and distinct schedule of sampling, testing and observation from that of the Quality Assurance Program.

Qualified sampling and testing personnel, other than those performing the verification and quality control (QC) sampling and testing, should perform the Independent Assurance (IA) tests. Likewise, equipment other than that used for verification and QC should be used for IA sampling and testing. Agency personnel or a Department designated accredited laboratory shall perform the testing.

While this Program provides detailed guidance regarding the IA Program, it is not a replacement for regular contact with NCDOT oversight staff. Please work closely with the Materials and Tests staff of the appropriate NCDOT Division office.

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1 Abbrevations and Terms

AASHTO: American Association of State Highway and Transportation Officials

Acceptance Sampling and Testing: Sampling and testing performed by the agency or its designated agent , to determine the quality and acceptability of the materials incorporated in a project. Also called "verification sampling and testing" when specifically used to validate the contractors data.

Accredited Laboratories: See Section 8 of the program.

Active Sampling/Testing Technicians: Personnel who meet the requirements as established in the Independent Assurance Program. Technicians are considered active if they have sampled materials or performed tests that are used by the Department to accept material. They are evaluated for each of the test methods for which they are performing. There may exist a subset of smaller "qualfied" testers that are unable to be assessed due to retirement, moved to other jobs or resigned.

CFR: Code of Federal Regulations

FHWA: Federal Highway Administration

HiCAMS: Highway Construction and Materials System – this is the computer-based system utilized by NCDOT to collect and store data regarding project samples.

IA: Independent Assurance

IA Assessment: The process conducted by a M&T employee or IA Certified Assessor to assess a qualified technician's ability to perform the required sampling/testing procedure accurately and proficiently.

IA Assessor: A qualified, full time, active certified, Materials & Tests employee, independent from QC and verification processes, who enforces the Independent Assurance program.

IA Certified Assessor: A qualified, full time, active certified, **Non-**Materials & Tests employee, who participates in the Independent Assurance program. This individual must be approved by the IA Program Engineer prior to any evaluation and/or assessments are conducted.

IA Evaluation: The process conducted by a M&T employee or IA Certified Assessor to evaluate a qualified technician's ability to perform the required sampling/testing procedure accurately and proficiently. The IA Evaluations consists of both an IA Assessment and an IA Split Sample, in most cases.

IA Evaluation Equipment: The testing equipment for the IA Evaluation shall be different than the equipment used in the Contractors quality control and Agency verification sampling and testing. The IA Assessor shall perform the comparison tests/split sample using their independent equipment.

IA Split Samples: Independent samples that are made simultaneously, then distributed and tested by the same qualified laboratory. The test results are compared to ensure that the laboratory is obtaining results within prescribed limits of variability.

M&T: Materials & Tests Unit

NCDOT: North Carolina Department of Transportation

Qualified Laboratories: Laboratories which have been approved, by the Materials & Tests Unit, to perform testing activities for NCDOT projects.

System-Based: A method of determining project testing frequencies that determines IA frequency on a time basis for all testers and equipment. The purpose is to cover all the testers and equipment over a period of one year. The Department will set a practical goal of an average percent of the active testers for all test methods included in the program. The system-based approach can be a more effective means of performing IA since it ensures that most testers are reviewed and that the same testers are not continually reviewed.

Technician Assessment: A Technician Assessment will be conducted at a minimum frequency on all active testers performing sampling, acceptance testing or verification testing. A qualified IA Assessor will perfom the assessment and document the results and findings.

Vendor: The computer-based system utilized by NCDOT to monitor technician certification history and qualifications.

Verification Sampling and Testing: Sampling and testing used to validate the contractor's data (see acceptance sampling and testing) and results.

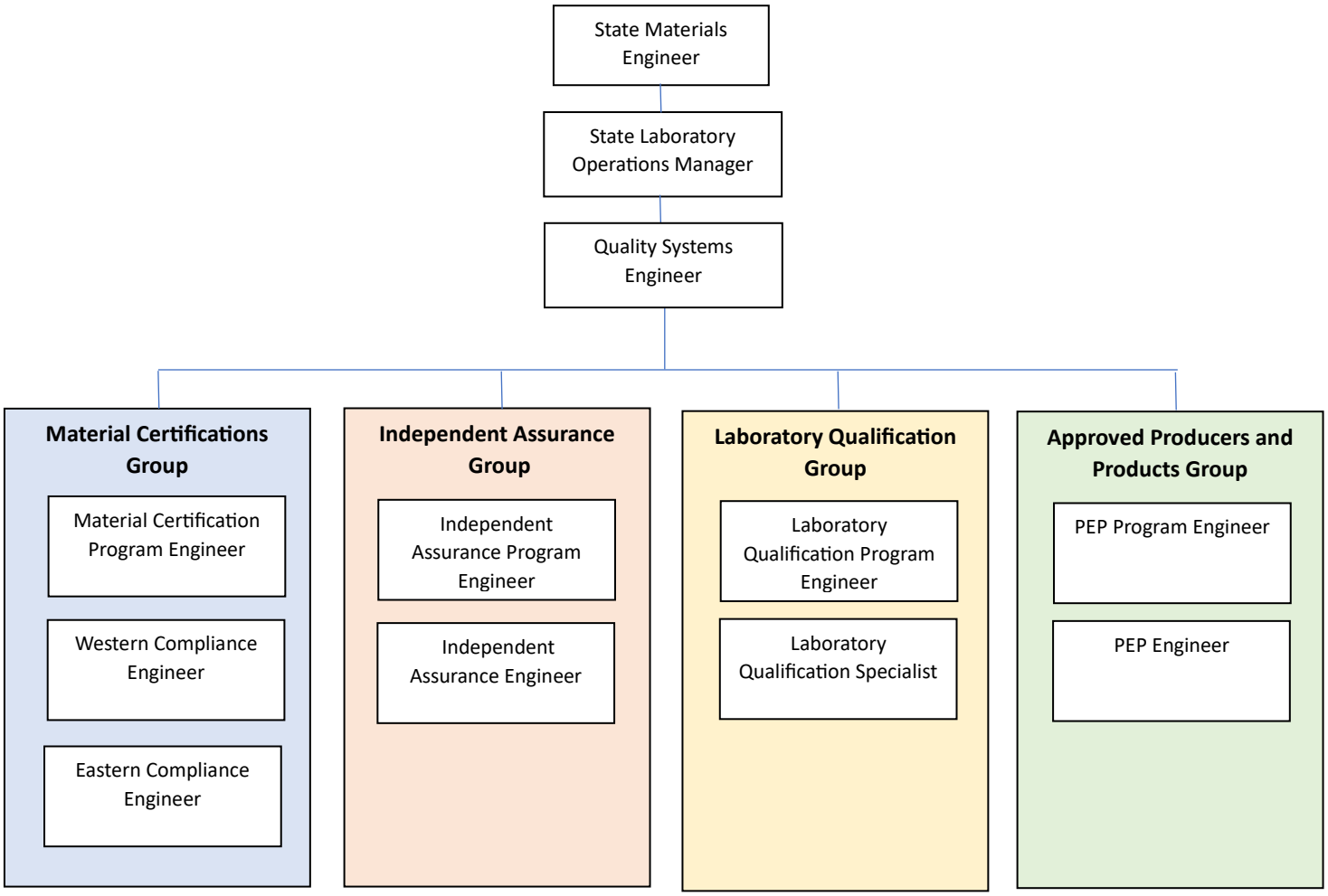
The NCDOT's IA Program is a system-based approach used to satisfy the independent assurance sampling and testing requirements for the following materials: Aggregate, Concrete, and Asphalt Mix. The IA Program is encouraged on all projects, however it is only required on projects on the National Highway System.

For the system-based approach, the frequency of IA activities is based on a calendar year time interval and is not determined by: the quantity of material used on a project, the number of active projects that may be assigned to a technician, or the amount of Federal funds alloted.

2 Quality Assurance Program Structure and Responsibilities

2.1 Organizational Structure

Figure 1 *Quality Systems Organizational Chart*



*The above positions may be located in regional areas across North Carolina.

2.2 Organizational Responsibilities

Table 1 *Position Titles and IA Related Duties*

Materials and Tests Unit's Quality Systems Group Responsibilities by Title	
Position	**QAP Related Duties**
State Materials Engineer	Management of the Materials & Tests Unit which includes: • Pavement Design • Field Operations • Laboratory Operations
State Laboratory Operations Manager	Management of all laboratory staff and activities which includes: • Central laboratory operations • Regional laboratory operations • Quality systems operations
Quality Systems Engineer	Management of the staff and activities, related to: • Material certification • Independent assurance • Laboratory qualification • Product evaluation
Material Certification Program Engineer	Management of the Material Certification Program which includes: • Certification of materials used on NCDOT Projects including FHWA, State Funded, Local Administered Projects, and Rail • Generates annual IA Program report to FHWA • Monitors and maintains the material certification program
Western and Eastern Compliance & Assurance Engineer	Daily oversight and assisting with the following: • Annual IA Program report to FHWA • Certification of materials used on NCDOT Projects including FHWA, State Funded, Local Administered Projects, and Rail • Maintenance of material certification Forms
Independent Assurance Program Engineer	Management and oversight with the following: • Monitors and maintains the IA Program • Verification of qualified staff utilized in the IA Program • Monitors IA training and certification programs/operations

Materials and Tests Unit's Quality Systems Group Responsibilities by Title	
Position	**QAP Related Duties**
	• HiCAMS/Vendor IA Data Input and Analysis • Maintaining modifications to IA programs
Independent Assurance Engineer	Daily oversight and assisting with the following: • Evaluation IA data and trends • Investigates excessive deviations on split sample results • Conducts State and Federal IA Audits • HiCAMS/Vendor IA Data Input and Analysis

Laboratory Qualification Program Engineer	Manage the Materials and Tests Unit's *Laboratory Qualification Program* which includes:
	• Ensuring all State Laboratories maintain accreditation by:
	  ○ Ensuring compliance with AASHTO and ASTM Standards
	  ○ Performing routine audits of the State Laboratories
	  ○ Leading cross-functional teams in process and system reviews
	  ○ Performing statistical analysis of proficiency sample trends
	  ○ Reporting and addressing non-conformities.
	• Private Laboratory Certifications

Laboratory Qualification Specialist	Monitors and maintains non-DOT laboratories which includes: • Verification of qualified staff • Maintaining calibration / standardization / equipment checks for their laboratory • Verification of AASHTO / CCRL Accreditation • Participate in annual laboratory audit • Conducts non-DOT laboratory approval • HiCAMS/Vendor IA Data Input and Analysis

Materials and Tests Unit's Quality Systems Group Responsibilities by Title	
Position	**QAP Related Duties**
Product Evaluation Program Engineer	Management of the NCDOT Approved Producers and Products group which includes: • Approved Products Program • Approved Producer Supplier Program • Resource Conservation Program • HiCAMS/Vendor IA Data Input and Analysis
Product Evaluation Engineer	Monitors and maintains the overall operations and integration of the Product Evaluation Program. • Research new products and technologies within the transportation industry, research other existing DOT specifications, and identify the cost-benefits analysis to improve the Department's strategic transportation investment decision-making process. • Develop and maintain the Approved Products List on the NCDOT websites and in the HiCAMS database. • Ensure coordination with national APEL databases, FHWA requirements, State and Federal Debarment Lists, and other regulatory agencies as necessary. • HiCAMS/Vendor IA Data Input and Analysis

3 General Program Requirements

Active Technicians who conduct acceptance sampling and/or testing for the Department must be qualified and have an active certification per the *NCDOT Qualified Personnel Program (see Chapter 9)*. The status of the technician's certification will be maintained using the NCDOT Vendor system.

Active Technicians are those which meet all the following:

- Performed any sampling or testing methods shown in *Table 2*, *Table 3*, *Table 4*, *Table 5*, *Table 6*, *Table 7*, and *Table 8* in 10 or more instances within the measured period (calendar year).
- The sampling or testing activities were on materials used by the Department for acceptance, agency verification testing, or contractor's QC testing.
- The technician must currently hold an "active" certification in the material discipline.

The need for an IA Evaluation is determined using a HiCAMS query for each of the designated sampling and/or testing methods to determine currently active technicians. The Department will not be able to perform an IA Evaluation on every active technician. The IA Program parameters are considered met if 90% of the active technicians for all test methods included in the program were evaluated.

Example:

Aggregate Sampling and Testing	87% of active technicians evaluated
Concrete Sampling and Testing	96% of active technicians evaluated
ASPHALT Sampling and Testing	92% of active technicians evaluated
Soil Density Sampling and Testing	89% of active technicians evaluated

Average = **91%**, therefore goal was achieved

The IA Evaluation consists of two parts:

Technician Assessment – An assessment (documented observation) of qualified technician's sampling and testing methods to determine competency.

IA Split Samples – The IA Split Sample is used to evaluate the technician's testing results verses IA evaluation results. The IA split sample shall be conducted on site while the tester is in the process of performing testing, when possible. Independent assurance samples may be taken separately from other samples or may be a split of a verification or acceptance sample. The IA sample results cannot be used in place of the acceptance or verification sample results. Since the sample will be split by two individuals, the initial sample should be twice as large when an IA Split Sample is taken. The testing equipment for the IA testing shall be different from that used for acceptance, such that the equipment can also be evaluated.

Note: All evaluations outcomes (acceptable or unacceptable) are based on the IA Assessor's test results.

The “Technician Assessment” and “IA Split Sample” can be conducted at the same time or at separate times during the calendar year.

The Technician Assessment portion is conducted by an M&T employee. If an M&T employee is not available, approval from the IA Program Engineer may authorize an “IA Certified Assessor” to conduct the assessment. Additionally, an M&T employee or “IA Certified Assessor” shall conduct the IA Split Sample test. At no time will a technician be evaluated by a member of the same firm.

3.1 Technician Assessment

The Technician Assessment process is a detailed step-by-step procedure for conducting an individual test method. An M&T employee will evaluate the technician and verify each phase of the assessed test methods. If a failure occurs, the assessor reviews all unsatisfactory items with the technician after the test. If remedial training is required, the IA Assessor will allow time for training and then re-evaluate the technician. If a re-assessment is conducted, the entire procedure is required to be satisfactorily completed. The IA Assessor will review and communicate the results of the assessment with the technician.

NOTE: If a technician attends and successfully passes a Department held certification class, it is counted towards the annual assessment for that year.

3.2 IA Split Sample

The IA Split Sample is independent from the Technician Assessment. Two M&T employees or one M&T employee and their representative will be required if the Technician Assessment and IA Split Sample are conducted at the same time. This process requires obtaining IA Split Samples simultaneously. The IA Split Sample shall be labeled as the following in HiCAMS:

- IA – Assessment (Aggregate)
- IA – Assessment (Asphalt)
- IA – Assessment (Concrete)
- IA - Assessment (Soil Density)

Do not use the IA Split Samples result as a substitute for the acceptance samples. IA Samples will be randomly obtained at the assessor’s judgment. Both the technician and the assessor will conduct their respective sampling operations following the proper testing procedures. The IA Assessor ensures the technician follows the proper techniques during the split sampling. At the conclusion of the evaluation, results will be reviewed and communicated to the technician. The IA Assessor will communicate the results of the IA Split Sample with the technician, once the results are determined by the laboratory.

3.3 Equipment Evaluation

Equipment used by any technician conducting sampling and testing for NCDOT FHWA-funded projects must be evaluated using one or more of the following equipment verifications: equipment critical dimensions, calibration checks, observations, or split samples. The IA Assessor shall utilize his/her own equipment in the IA Evaluation process. They will also record equipment appearance and verification on the Technician Assessment Worksheet. If a failure occurs during a Technician Assessment, due to faulty equipment, it will be recorded as an unsatisfactory evaluation and will be a deficiency against the technician. If equipment fails to meet the required calibration frequency and/or equipment evaluation,

it will not be allowed for assessment and/or IA split sampling purposes. Additionally, it should be removed for use.

3.4 Evaluation of Deficiencies

If failure(s) occurs during the evaluation and the IA Assessor feels the technician is proficient in the sampling/testing method, one re-evaluation is approved. If at any time, the technician omits a step or makes an error, and the technician voluntarily aborts the test method, the technician is allowed one re-evaluation. All re-evaluations are required on the same test method and the technician must start from the beginning of the test method. All re-evaluations shall be documented on the worksheet regardless of the cause.

If a re-evaluation is approved by the IA Assessor, the re-evaluation will be conducted within the annual evaluation period. It will be the responsibility of the failing technician to establish a re-evaluation appointment, at the IA Assessors convenience. If a re-evaluation is not conducted within the annual yearly period, the technician's certification will be revoked, and they will no longer be permitted to sample/test material on NCDOT FHWA-funded projects. The maximum number of allowed trials (including re-evaluations) on any test method shall not exceed two. If the technician cannot successfully pass the test method within the allowed trials, their certification will be revoked, and the technician will not be allowed to sample/test material on NCDOT FHWA-funded projects. To reinstate a revoked certification, the technician must attend the certification training course and successfully pass all requirements.

Refusal to participate or a lack of cooperation in the IA Evaluation will be sufficient reason to consider an evaluation unsatisfactory. If a technician refuses to participate, a conduct and proficiency review will be conducted to the certification board. After the review, appropriate measures will be taken.

3.5 Laboratory

Laboratory testing of all IA Split Samples will be conducted at a NCDOT approved and qualified laboratory. All laboratory equipment will be calibrated/standardized/checked as required by the AASHTO test procedures and/or NCDOT policies.

The NCDOT Materials Laboratories will calibrate all required equipment per the Laboratory QMS as required by AASHTO test method or NCDOT policies and procedures. Verification of calibration and expiration will be documented and affixed to each applicable piece of equipment.

The NCDOT Materials Laboratories will be active in the AASHTO Accreditation program and an accredited laboratory. The State Materials Laboratory will review and qualify on-site laboratories and any CEI laboratory that conducts testing on NCDOT projects. A certificate of approval, with an expiration date, will be granted and must be displayed at the facility.

3.6 IA Split Sample Testing- Laboratory

All laboratory equipment will be calibrated/standardized/checked as required by the AASHTO test procedures and/or NCDOT policies.

IA Split Samples will be tested by the nearest NCDOT regional laboratory, or a laboratory that has been approved by the Laboratory Qualification Engineer. The laboratory technician performing the comparison evaluation of the IA Split Sample must be qualified in the procedures being evaluated.

3.7 Investigation Process and Dispute Resolution

If there are any "unacceptable" comparisons (Technician Assessment or IA Split Sample results), an investigation shall be conducted to determine the cause of the discrepancy. The investigation will include verification of test results and calculations; inspection of equipment; evaluation of test procedures; review of the IA Assessor's report and comments; discussion with the technician and his/her knowledge of the test procedure; and retesting of samples and procedures. All information shall be documented, and recommendations will be included in the report. The results of the investigation shall be reported to the IA Program Engineer in a prompt and timely manner.

Once the Department's Independent Assurance Group receives the split sample test results, they will be reviewed prior to filing. If a laboratory or field test result is outside the acceptable tolerance, an investigation ***will*** be initiated at the discretion of the IA staff. The investigation includes the following steps:

1. IA staff will require a re-evaluation of the technician and the materials sample in question as soon as possible. The splitting and sampling process will be scrutinized to ensure the issue cannot be traced back to these steps. Equipment will be closely inspected for damage or wear and that it is within the calibration period. Another split sample will be taken.
    a. If faulty equipment is found, the equipment must be taken out of service immediately. The finding will be documented, and the resolution sent to the IA Program Engineer. No further action is required.
    b. If the technician was found to be using improper procedures, the technician's certification may be suspended pending an investigation. The technician will need to be re-trained prior to performing any Department acceptance or verification sample testing. Once they can demonstrate proficiency to the IA staff, their certification will be reinstated.
    c. If results from the re-evaluation come back within tolerance, the finding will be documented, and the resolution sent to the IA Program Engineer.
    d. If the re-evaluation is again out of tolerance, IA staff will require another sample as soon as possible. The following options will be determined on a case-by-case basis:
        1. A different IA staff may perform the review.
        2. Test equipment can either be exchanged with different equipment or the testing performed at another laboratory.
        3. All test equipment involved will be inspected for accuracy.

4 Specific Program Requirements

4.1 Aggregate IA Program

A. Qualification of Aggregate IA Technician

At a minimum, the Aggregate IA Technician must have successfully completed the following NCDOT Courses:

- QC/QA Aggregate Sampling Technician
- QC/QA Aggregate Testing Technician
- ABC Sampling Technician
- ABC Nuclear Density Technician
- MT – Aggregate Assessment Level 1
- MT – Aggregate Assessment Level 2
- MT – QMS Density Gauge Assessor
- MT- Conventional Density Assessor

B. Conducting Aggregate IA Test Procedures

1. One IA Evaluation, per test procedure that the tester will be performing, per active technician, per calendar year is required. The IA Evaluation is to be conducted as soon as practical after the active technician meets the requirements set forth in *Section 5* of this document.
2. Tests covered are those listed in *Table 2* and *Table 3*.
3. The Assessment and the IA Split Sample do not have to be performed at the same time, but if they are, a second representative shall be present so their full attention will be on assessing the technician and not physically performing the comparison test.
4. The split samples shall be tested by the technician being evaluated at their laboratory and at the closest M&T laboratory.
5. Utilizing "IA Certified Assessors" is fully advantageous and approved within this Aggregate IA Program. This is only acceptable if the NCDOT Aggregate QC/QA Engineer, or his Aggregate Specialist, review and certify by signature the operations and results.

C. Evaluation Aggregate IA Test Results

The following limits should be used when evaluating Aggregate Independent Assurance tests. All deviations outside the acceptable tolerance are considered unsatisfactory and require an investigation.

Table 2 *Fine Aggregate Required Evaluation and Tolerance*

Fine Aggregate Required Evaluations and Tolerance						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance	**Unacceptable Tolerances**
Stockpile Sampling	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	No	N/A	N/A
Gradation AASHTO T 27	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	Yes	≤ 10 % per Sieve	> 10 % per Sieve
Fineness Modulus AASHTO T 27	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	Yes		
Loss By Washing AASHTO T 11	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	Yes	≤ 10 %	> 10 %

Table 3 *Coarse Aggregate Required Evaluation and Tolerance*

Coarse Aggregate Required Evaluations and Tolerance						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance	**Unacceptable Tolerance**
Stockpile Sampling	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	No	N/A	N/A
Gradation AASHTO T 27	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	Yes	≤ 10 % per Sieve	> 10 % per Sieve
Loss By Washing AASHTO T 11	Quarry QC Personnel	HiCAMS Query on QAP - Aggregates	Yes	Yes	≤ 10 %	> 10 %

4.2 Concrete IA Program

A. Qualification of Concrete IA Technician

At a minimum, the Concrete IA Technician must have successfully completed the following NCDOT Courses:

- Concrete Field Technician (Testing)

B. Conducting Concrete IA Test Procedures

1. One IA Evaluation, per test procedure that the tester will be performing, per active technician, per calendar year is required. The IA Evaluation is to be conducted as soon as practical after the active technician meets the requirements set forth in *Section 5* of this document.
2. Tests covered are those listed in *Table 4*.
3. The Assessment and the IA Split Sample do not have to be performed at the same time, but if they are, a second representative shall be present so their full attention will be on assessing the technician and not physically performing the comparison test.
4. The split samples shall be tested simultaneously by the technician being evaluated and the M&T representative using different equipment.

C. Evaluation Concrete IA Test Results

The following limits should be used when evaluating concrete Independent Assurance tests. All deviations outside the acceptable tolerance are considered unsatisfactory and require an investigation.

Table 4 *Portland Cement Concrete Required Evaluation and Tolerance*

Portland Cement Concrete Required Evaluations and Tolerance (Excludes Precast, Prestress, Pavement and Volumetric)						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance (Between Tests)	**Unacceptable Tolerance** (Between Tests)
Slump ASTM C 143	DOT Field Personnel	HiCAMS Query on Samples	Yes	Yes	≤ 1.0”	> 1.0”
Air Content: Air Pressure Meter ASTM C 231	DOT Field Personnel	HiCAMS Query on Samples	Yes	Yes	≤ 1 %	> 1 %
Temperature ASTM C 1064	DOT Field Personnel	HiCAMS Query on Samples	Yes	Yes	≤ 3°	> 3°
Specimen Fabrication ASTM C31	DOT Field Personnel	HiCAMS Query on Samples	Yes	Yes *Based on compressive strength	≤ 500 psi	> 500 psi

4.3 QMS Level I Plant Technician IA Program

A. Qualification of QMS Level I Plant IA Technician

At a minimum, the QMS Level I Plant IA Technician must have successfully completed the following NCDOT Courses:

- Introduction to Asphalt Pavements
- QMS Level I Plant Technician

B. Conducting QMS Level I Plant Test Procedures

1. One IA Evaluation, per test procedure that the tester will be performing, per active technician, per calendar year is required. The IA Evaluation is to be conducted as soon as practical after the active technician meets the requirements set forth in *Section 5* of this document.
2. Tests covered are those listed in Table 5.
3. The Assessment and the IA Split Sample do not have to be performed at the same time, but if they are, a second representative shall be present so their full attention will be on assessing the technician and not physically performing the comparison test.
4. The split sample shall be tested and evaluated at an appropriate M&T regional laboratory utilizing the laboratory's equipment. The maximum time for a split sample to be tested is 5 days.

C. Evaluation QMS Level I Plant IA Test Results

The following limits should be used when evaluating ASPHALT Independent Assurance tests. All deviations outside the acceptable tolerance are considered unsatisfactory and require an investigation.

Table 5 *Asphalt QC Laboratory Required Evaluation and Tolerance*

Asphalt QC Laboratory - Level I Plant						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance	**Unacceptable Tolerance**
Sampling and Quartering	Plant QC Technician	HiCAMS Query on QAP - Asphalt	Yes	No	N/A	N/A
Binder Content AASHTO T 308	Plant QC Technician	HiCAMS Query on QAP - Asphalt	Yes	Yes	≤ 1.0 %	> 1.0 %
Bulk Specific Gravity AASHTO T 312 and T 166 / T 331	Plant QC Technician	HiCAMS Query on QAP - Asphalt	Yes	Yes	≤ 0.060	> 0.060
Theoretical Maximum Specific Gravity AASHTO T 209 or D 6857	Plant QC Technician	HiCAMS Query on QAP - Asphalt	Yes	Yes	≤ 0.040	> 0.040
Recovered Aggregate Gradation AASHTO T 30	Plant QC Technician	HiCAMS Query on QAP - Asphalt	Yes	Yes	See *Table 6*	See *Table 6*
Roadway Core Samples AASHTO	Plant QC Technician	HiCAMS	Yes	Yes	≤ 2.0 %	> 2.0 %

Table 6 *Recovered Aggregate Gradation Sieve Analysis*

Sive Analysis	Acceptable Tolerance	Unacceptable Tolerance
25.0 mm (Base Mix)	≤ 20.0%	>20.0%
19.0 mm (Base Mix)	≤ 20.0%	>20.0%
12.5 mm (Intermediate Mix)	≤ 12.0%	>12.0%
9.5 mm (Surface Mix)	≤ 10.0%	>10.0%
4.75 mm (Surface Mix)	≤ 10.0%	>10.0%
2.36 mm (All mixes except S 4.75)	≤ 10.0%	>10.0%
1.18 mm (S 4.75A)	≤ 10.0%	>10.0%
0.075 mm (All Mixes)	≤ 4.0%	>4.0%

4.4 QMS Roadway Technician IA Program

A. Qualification of QMS Roadway IA Technician

At a minimum, the QMS Roadway IA Technician must have successfully completed the following NCDOT Courses:

- QMS Roadway Technician
- Asphalt Independent Assessment Inspector

B. Conducting QMS Roadway IA Test Procedures

1. One IA Evaluation, per test procedure that the tester will be performing, per active technician, per calendar year is required. The IA Evaluation is to be conducted as soon as practical after the active technician meets the requirements set forth in *Section 5* of this document.
2. Tests covered are those listed in *Table 7*.
3. The Assessment and the IA Split Sample do not have to be performed at the same time, but if they are, a second representative shall be present so their full attention will be on assessing the technician and not physically performing the comparison test.
4. The split samples shall be tested simultaneously by the technician being evaluated and the M&T representative using different equipment.

C. Evaluation QMS Roadway IA Test Results

The following limits should be used when evaluating Asphalt Independent Assurance tests. All deviations outside the acceptable tolerance are considered unsatisfactory and require an investigation.

Table 7 *Asphalt Roadway Density Test Evaluation and Tolerance*

Asphalt Roadway Technician						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance	**Unacceptable Tolerance**
Nuclear Density Testing	Roadway QC Technician	HiCAMS Query – Density Asphalt Nuclear QC	Yes	Yes	≤ 4 %	> 4 %

4.5 Soil Density IA Program

A. Qualification of Soil IA Technician

At a minimum, the Soil IA Technician must have successfully completed the following NCDOT Courses:

- Conventional Density

B. Conducting Soil IA Test Procedures

1. One IA Evaluation, per test procedure that the tester will be performing, per active technician, per calendar year is required. The IA Evaluation is to be conducted as soon as practical after the active technician meets the requirements set forth in *Section 5* of this document.
2. Tests covered are those listed in *Table 8*.
3. The Assessment and the IA Split Sample do not have to be performed at the same time, but if they are, a second representative shall be present so their full attention will be on assessing the technician and not physically performing the comparison test.
4. The split samples shall be tested simultaneously by the technician being evaluated and the M&T representative using different equipment.

C. Evaluation Soil IA Test Results

The following limits should be used when evaluating concrete Independent Assurance tests. All deviations outside the acceptable tolerance are considered unsatisfactory and require an investigation.

Table 8 *Conventional Density Required Evaluation and Tolerance*

Conventional Density Required Evaluations and Tolerance						
Item	**Acceptance Sampled By**	**Determined by**	**Assessment Required?**	**Split Comparison Required?**	**Split Sample Tolerance**	
					Acceptable Tolerance (Between Tests)	**Unacceptable Tolerance (Between Tests)**
Conventional Density ASSHTO T99	DOT Field Personnel	HiCAMS Query on Samples	Yes	Yes	≤ 5.0%	> 5.0%

5 Assessment Forms

IA Assessors will utilize checklists for the Technician Assessments. The purpose of the checklist is to provide assurance that acceptance sampling and testing procedures are accomplished in accordance with the specified procedures and to compare testing equipment. Assessment forms will be reviewed as needed to update the procedural steps in accordance with national and/or NCDOT standards and specifications. Assessment forms are located in the Appendix of this document.

Appendix A: Fine Aggregate Technician Assessment Forms

Appendix B: Coarse Aggregate Technician Assessment Forms

Appendix C: Concrete Technician Assessment Forms

Appendix D: ASPHALT Roadway Technician Assessment Forms

Appendix E: Asphalt QC Laboratory Technician Assessment Forms

Appendix F: Conventional Density Technician Assessment Forms

6 Independent Assurance Data Storage

All material and technician acceptance information are stored in the Highway Construction and Materials System (HiCAMS) and Vendor systems. This system contains data retention, technician assessments, technician certification class enrollment and outcomes, ability to track material developments, and documentation management.

7 Annual Report of IA Program Results

The Quality Systems Engineer will compile and submit an annual report to the FHWA Division Administrator summarizing the results of the NCDOT system-based Independent Assurance Program. The report shall identify the number and type of tests performed, the number of sampling and testing personnel evaluated, and the number and type of equipment evaluations performed. In addition, the report shall identify the independent assurance evaluations found to be acceptable, the number found to be unacceptable, and a summary of any system-wide corrective actions taken.

8 Laboratory Qualification Program

The requirements for laboratory qualification are uniform for all laboratories performing acceptance and verification testing for the NCDOT. Compliance with AASHTO R18, *Establishing and Implementing a Quality System for Construction Materials Testing Laboratories* is required for all laboratories.

8.1 Qualification of the NCDOT Central and Regional Laboratories

The Central and Regional Laboratories are fully accredited in all testing performed when applicable. AASHTO resource is utilized to ensure compliance with R18. This involves AASHTO and CCRL inspections which are used to ensure compliance of laboratory testing equipment and review of personnel qualifications.

The Laboratory Qualifications Engineer is located at the Central Laboratory and works independently from any of the NCDOT Laboratory Supervisors. This position ensures NCDOT remains compliant with AASHTO resource by maintaining the required documents for AASHTO R18. This position and their team perform laboratory inspections of equipment, personnel, and test procedures.

All testing equipment that is not in compliance with applicable AASHTO or NCDOT Methods may not be used for acceptance evaluations.

8.2 Qualification for other Laboratories Providing Acceptance Data for NCDOT Projects

When used for acceptance testing, all laboratories performing Aggregate, Asphalt, and/or Concrete testing will be required to be AASHTO accredited (or equivalent) to perform testing for the Department. The Laboratory Qualifications Engineer and their staff ensure compliance of these non-NCDOT laboratories.

Independent Assurance sample comparison tests and proficiency sample testing will be performed at random frequencies.

9 Qualified Personnel Program

9.1 General Information

Technicians who conduct acceptance sampling and testing for the Department must meet all requirements and certifications as described in the "NCDOT Qualified Personnel Program". Qualifications and certifications will be maintained and verified using the NCDOT Vendor system. Other qualifications may apply as defined in the NCDOT Construction Manual, Special Provisions, or NCDOT Policies and Procedures. Test methods not covered by this program for acceptance are not included in the IA Program.

9.1.1 Active Certified Technicians

Active Certified Technicians are those which meet all the following:

- Perform any sampling or testing methods referenced in the IA Program in ten or more instances within the measured period (calendar year).
- The sampling or testing activities were on materials used by the Department for acceptance or verification.
- The technician must successfully pass the NCDOT certification training requirements to achieve the certification in the material discipline described in this document.
- The certification must be current at the time when sampling and testing was performed.

9.1.2 NCDOT Certification Training Requirements

The NCDOT active certified technician is responsible for various duties and responsibilities while conducting sampling and testing of materials on project sites or in an approved laboratory. These duties and responsibilities include: maintains NCDOT certifications required for sampling and testing; performs acceptance tests only for those materials the technician is currently certified to conduct (see Table 1 for certifications required to perform specific tests); ensures that equipment is functioning correctly; maintains proper calibration requirements and documentation; cleans and maintains test equipment to ensure that it is kept in an operable condition; and notifies the Materials and Tests staff when IA Evaluations are applicable.

Table 9 *Certifications Required to Perform Specific Tests*

Certifications Required to Perform Specific Tests		
Procedure	**Required Certification Training**	**Certification Length**
Fine Aggregate		
Stockpile Sampling	Aggregate QC/QA (Sampling) MAT 400	5 years
Gradation	Aggregate QC/QA (Testing) MAT 405 & (Sampling) MAT 400	5 years
Fineness Modulus	Aggregate QC/QA (Testing) MAT 405 & (Sampling) MAT 400	5 years
Loss By Washing	Aggregate QC/QA (Testing) MAT 405 & (Sampling) MAT 400	5 years
Coarse Aggregate		
Stockpile Sampling	Aggregate QC/QA (Sampling) MAT 400	5 years
Gradation	Aggregate QC/QA (Testing) MAT 405 & (Sampling) MAT 400	5 years
Loss By Washing	Aggregate QC/QA (Testing) MAT 405 & (Sampling) MAT 400	5 years
Portland Cement Concrete		
Slump	Concrete Field Technician (Testing) MAT 100	5 years
Air Content	Concrete Field Technician (Testing) MAT 100	5 years
Temperature	Concrete Field Technician (Testing) MAT 100	5 years
Specimen Fabrication	Concrete Field Technician (Testing) MAT 100	5 years
Asphalt QC Laboratory – Level I Plant		
Sampling & Quartering	QMS Level 1 Plant Technician (MAT 525)	5 years
Binder Content	QMS Level 1 Plant Technician (MAT 525)	5 years
Bulk Specific Gravity	QMS Level 1 Plant Technician (MAT 525)	5 years
Theoretical Maximum Specific Gravity	QMS Level 1 Plant Technician (MAT 525)	5 years
Recovered Aggregate Gradation	QMS Level 1 Plant Technician (MAT 525)	5 years
Roadway Core Specific Gravity	QMS Level 1 Plant Technician (MAT 525)	5 years
ASPHALT Roadway Technician		
Nuclear Density Testing	QMS Nuclear / Non-Nuclear Density (Testing) MAT 380	5 years
Density Core Sampling	QMS Roadway Technician MAT 535	5 years
Soil Density Technician		
Conventional Density	Conventional Density MAT230	5 Years

9.1.3 Certification Responsibility

It is the responsibility of the technician to maintain their certifications and schedule re-certifications prior to expiration. If a technician fails an exam and/or loses a certification, it is the responsibility of the technician to contact the Materials & Tests Unit to reschedule a test or retake the class next session.

All certifications expire December 31st of the fifth year. If a field certification is required, this evaluation must be conducted no more than three months after passing the classroom exam. Provisional certifications will not be issued for technicians who have failed exams or allowed certifications to expire. Current certifications will be maintained in the Departments Vendor

system and personnel changes should be updated when necessary. It is recommended to verify certifications prior to any IA Evaluation.

9.2 Geomaterials Courses

9.2.1 Aggregate Sampling (Roadway)

Course Code: MAT 210
Length of Class: 4 hours
PDH Credits: 2 hours
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper sampling procedures for obtaining and submitting Roadway Acceptance (RA) and Roadway Informational (RI) samples. Aggregate materials include ABC, CTBC, Stabilizer Aggregate, and Class IV Material delivered to a project. To maintain or renew this certification a self-study option is available. When completing the self-study option, the technician is responsible for studying and preparing for the written examination.

9.2.2 Conventional Density

Course Code: MAT 230
Length of Class: 2 days
PDH Credits: N/A
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper testing procedures for performing various density acceptance tests on soils materials (i.e., embankment, subgrade, chemically stabilized subgrade, etc.). To maintain or renew this certification a self-study option is available. When completing the self-study option, the technician is responsible for studying and preparing for the written examination.

9.2.3 Borrow Pit Sampling

Course Code: MAT 410
Total Length of Class: 4 hours
PDH Credits: 2.5 hours
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper sampling procedures for obtaining and submitting soil samples from a proposed borrow pit. To maintain or renew this certification a self-study option is available. When completing the self-study option, the technician is responsible for studying and preparing for the written examination.

9.2.4 Nuclear Safety and Hazardous Materials

Course Code: MAT 250
Length of Class: 8 hours
PDH Credits: 5.5 hours
Pre-requisites: None
Certification Length: Indefinite
Note: must complete refresher training every 3 years if actively receiving nuclear film badge.

Course Description: This course is designed to instruct technicians and engineers in safety procedures, rules, and regulations regarding radioactive and hazardous materials. The course is for NCDOT employees/representatives only and is required by the Department's Radioactive Materials License.
NCDOT personnel actively receiving a nuclear film badge must also complete refresher training every 3 years (USDOT requirement).

9.2.5 Nuclear Density Testing- Base, Select, and FDR Materials

Course Code: MAT 370
Length of Class: 6 hours
PDH Credits: 4.5 hours
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in performing nuclear density acceptance testing for base (i.e., ABC or CTBC), select, or FDR materials.

9.3 Concrete Courses

9.3.1 Concrete Field Technician

Course Code: MAT 100
Length of Class: 3 days
PDH Credits: N/A
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper sampling and testing procedures for acceptance of concrete. The course has two parts, a NCDOT session (covering DOT specification requirements) and an ACI Concrete Field Technician Grade 1 session. The ACI session follows ACI requirements which includes successful completion of a Field Performance Examination and a Written Examination. Successful completion of both NCDOT and ACI sessions is required to perform concrete acceptance testing/sampling for NCDOT projects. Students attending the course for the first time must complete the requirements on the OJT checklist form: Concrete Field Technician Certification PRE-REQUISITE MEMO and FORM For New Attendees Attached.pdf (ncdot.gov)

Please refer to the *Concrete School Policies* posted on the Materials and Tests website for more information.

9.3.2 Portland Cement Concrete Pavement (PCCP)

Course Code: MAT 130 & MAT 131
Length of Class: 2 days
PDH Credits: N/A
Pre-requisites: Concrete Field Technician Class (NCDOT and ACI sessions)
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper procedures for performing inspection and acceptance of concrete pavement operations. Successful completion of the Concrete Field Technician course is a pre-requisite to attend. Please refer to the Concrete School Policies posted on the Materials and Tests website for more information. These courses are scheduled specifically for projects utilizing concrete pavement and must be requested. To request a PCCP course contact the local Materials and Tests Section Materials Specialist.

9.4 Aggregate Sampling and Testing Courses

9.4.1 QC/QA Aggregate Sampling

Course Code: MAT 400
Length of Class: 4 hours
PDH Credits: N/A
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is part of the Aggregate QC/QA Program and is designed to instruct technicians and engineers in obtaining coarse and fine aggregate samples at quarries, sales yards, or other stockpiled aggregate locations.

9.4.2 QC/QA Aggregate Testing

Course Code: MAT 405
Length of Class: 4 hours
PDH Credits: N/A
Pre-requisites: QC/QA Aggregate Sampling Certification and completion of a field evaluation by a representative from the Geomaterials Laboratory
Certification Length: 5 years

Course Description: This course is part of the Aggregate QC/QA Program and is designed to instruct technicians and engineers in performing acceptance tests on coarse and fine aggregate. Students are required to complete an on-site field evaluation demonstrating proficiency in

aggregate testing techniques and hold a valid Aggregate QC/QA Sampling certification to obtain this Aggregate QC/QA Testing certification.

9.5 Asphalt Courses

9.5.1 Introduction to Asphalt

Course Code: CON-250
Length of Class: 12 hours (online)
PDH Credits: N/A
Pre-requisites: N/A
Certification Length: Indefinite

Course Description: This course is designed to introduce technicians and engineers to asphalt paving practices and materials and is a pre-requisite for other asphalt training courses. Stanly Community College continuing education program offers this course online and additional information is provided at Introduction to Asphalt | Stanly Community College - North Carolina Additional information is also provided on the Materials and Tests website.

9.5.2 QMS Density Gauge (Asphalt)

Course Code: MAT 380
Length of Class: 7 hours
PDH Credits: 6.0 hours
Pre-requisites: None
Certification Length: 5 years

Course Description: This course is a part of the QMS Program for asphalt and is designed to instruct technicians and engineers in performing nuclear or non-nuclear density acceptance testing for asphalt mixes. To maintain this certification a self-study option is available. The technician is responsible for studying and preparing for the written examination.

9.5.3 QMS Roadway Technician

Course Code: MAT 535
Length of Class: 2 days
PDH Credits: N/A
Pre-requisites: Introduction to Asphalt Course
Additional Training: Complete and submit QMS Roadway OJT packet 10 Day OJT Checklist Full Packet.pdf (ncdot.gov) (first time attendees only)
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper procedures for monitoring and inspecting asphalt pavement operations. Successful completion of the OJT checklist packet is required to attend the course for the first time. Please visit the Materials and Tests website for additional information.

9.5.4 QMS Roadway Technician- Online

Course Code: MAT 535-T
Length of Class: 12 hours (online)
PDH Credits: N/A
Pre-requisites: Introduction to Asphalt Course
Certification Length: 5 years

Course Description: This course is conducted online through Stanly Community College and is designed to instruct technicians and engineers in the proper procedures for monitoring and inspecting asphalt pavement operations. Additional information is provided at Stanly Community College website QMS Roadway Technician | Stanly Community College - North Carolina. This online option is only available for personnel needing to renew their QMS Roadway Technician certification (not an option for first time attendees). Please visit the Materials and Tests website for additional information.

9.5.5 QMS Level I Plant Technician

Course Code: MAT 525
Length of Class: 2 days
PDH Credits: N/A
Pre-requisites: Introduction to Asphalt Course
Additional Training: Complete and submit QMS Level I OJT packet QMS Plant Level 1 Tech OJT Full Packet.pdf (ncdot.gov) (first time attendees only)
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper procedures for asphalt production, sampling, and testing for compliance the NCDOT Standard Specifications and the QMS program. Successful completion of the OJT checklist packet is required to attend the course for the first time. Please visit the Materials and Tests website for additional information.

9.5.6 QMS Level II Plant Technician

Course Code: MAT 530
Length of Class: 2 days
PDH Credits: N/A
Pre-requisites: Minimum of one year with a valid QMS Level I Technician
Additional Training: Completion of an approved Mix Design Course
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper procedures for making mix adjustments and asphalt mix problem. Please visit the Materials and Tests website for additional information.

9.5.7 QMS Asphalt Mix Design Technician

Course Code: MAT 580
Length of Class: 1.5 days
PDH Credits: N/A
Pre-requisites: QMS Level I or Level II Technician or completion of Level I OJT and enrollment in a Level I class, or equivalent experience as determined by the Asphalt Mix Design Engineer
Additional Training: Completion of an approved Mix Design Course
Completion of Aggregate Consensus Properties Checklist
Certification Length: 5 years

Course Description: This course is designed to instruct technicians and engineers in the proper procedures for making mix adjustments and troubleshooting asphalt mix problems. Please visit the Materials and Tests website for additional information.

Appendix A-Fine Aggregate

Technician Assessment Form

Fine Aggregate Technician Assessment & IA Split Sampling Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Fine Aggregate Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Stockpile Sampling	Choose an item.	Click or tap here to enter text.
Gradation & Fineness Modulus	Choose an item.	Click or tap here to enter text.
Loss By Washing	Choose an item.	Click or tap here to enter text.

Fine Aggregate IA Split Sampling Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Gradation & Fineness Modulus	Choose an item.	Click or tap here to enter text.
Loss By Washing	Choose an item.	Click or tap here to enter text.

Notes:
Click or tap here to enter text.

Fine Aggregate Stockpile Sampling
NCDOT IA Assessment

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify all equipment and tools meet all requirements per Standard.	Choose an item.	Choose an item.
2. **Stockpile Sampling**		
A. Obtain the sample from an area that represents material being shipped.	Choose an item.	Choose an item.
B. The sample shall be obtained from an aggregate that has been picked up by a loading unit from the existing stockpile. The material from which the samples are to be obtained should be approximately one full loader bucket.	Choose an item.	Choose an item.
C. The loading unit shall dump the material on the ground as if loading a truck. Care shall be taken not to drop material from an excessive height, which could cause material to segregate. Then, strike off and level to approximately half the original pile height.	Choose an item.	Choose an item.
D. The flat surface shall be divided into four sections. Identify sampling areas as A, B, C, D.	Choose an item.	Choose an item.
E. Opposite quadrants, such as A and D, or B and C shall be used to acquire the sample.	Choose an item.	Choose an item.
F. While obtaining material with the shovel, care shall be taken to prevent spillage of material while transferring material to the sample container.	Choose an item.	Choose an item.
Tube Sampling (Optional)		
A. Obtain the sample from an area that represents material being shipped.	Choose an item.	Choose an item.
B. Fine aggregate samples may be obtained from the stockpile using a tube approved by the Department. The tube shall be a minimum of $1^1/_4$" (30mm) in diameter by 6 feet (2m) in length. The tube shall be constructed of aluminum or PVC.	Choose an item.	Choose an item.

C.	The sample is obtained by inserting the tube into the stockpile at evenly spaced locations across the load face of the stockpile. A minimum of five insertions of the tube shall be made.	Choose an item.	Choose an item.
D.	The insertions are to be made at a minimum height of three feet from the bottom of the stockpile.	Choose an item.	Choose an item.

3. **Sample Splitter**

A.	Splitter is resting level on a stable surface.	Choose an item.	Choose an item.
B.	Finger gate settings open at least $1^1/_2$ times larger than the materials nominal size to be split.	Choose an item.	Choose an item.

Method A

C.	Place half of the material on the top of the splitter.	Choose an item.	Choose an item.
D.	Open the splitter slowly, allowing the material to flow into the two catch pans.	Choose an item.	Choose an item.
E.	Switch the pans from one side of the splitter to the other and place the remainder of the material on top of the splitter.	Choose an item.	Choose an item.
F.	Open the splitter slowly, allowing the remainder of the material to flow into the two catch pans.	Choose an item.	Choose an item.

Method B

G.	Place all the material on the top of the splitter.	Choose an item.	Choose an item.
H.	Open the splitter slowly, allowing the material to flow into the two catch pans.	Choose an item.	Choose an item.
I.	Compare the weights of the two pans to see if they are within 3% of each other.	Choose an item.	Choose an item.
J.	If they are not within this tolerance, place all the material back on top of the splitter and repeat the procedure.	Choose an item.	Choose an item.

Sampling Using A Divider – This procedure may be required for fine aggregates if the material has a moisture content that prevents the material from freely falling through a sample splitter.

K.	Use of an impervious surface such as a steel plate, and a four-way divider.	Choose an item.	Choose an item.
L.	If a table is used, it shall be approximately 28 inches deep by 32 inches wide.	Choose an item.	Choose an item.
M.	The four-way divider shall have legs approximately 28 inches long the intersect in the middle, forming a right angle. The device shall be approximately 5 inches tall.	Choose an item.	Choose an item.
N.	The material shall be split before the material is completely dry.	Choose an item.	Choose an item.

O. Place all the moist material in the center of the table. Remix the sample thoroughly and mound it in a cone shaped pile approximately 6 inches high.	Choose an item.	Choose an item.
P. Push the four-way divider down through the center of the pile until contact with the table surface is made. Slide the divider back and forth on the table surface to separate the fine aggregate sections from each other slightly.	Choose an item.	Choose an item.
Q. Remove two of the opposite quadrants (sections) of material. Remix the remaining two quadrants and repeat the procedure as necessary until the remaining material is the correct quantity for the test to be run.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

Note: An IA-Split Sampling is not required for this procedure.

Fine Aggregate Gradation and Fineness Modulus Method - AASHTO T27

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		1st Trial	2nd Trial
1.	Verify all equipment and tools meet all requirements per the AASHTO Standard.	Choose an item.	Choose an item.
2.	Once the sample is dried to a constant mass, it is allowed to cool to the touch prior to proceeding with any testing procedures.	Choose an item.	Choose an item.
3.	Based on the Specifications for the material being tested, the proper sieves are selected. Additional sieve(s) may be added as needed to determine Fineness Modulus or to prevent sieve overloading.	Choose an item.	Choose an item.
4.	The sieves are placed into the mechanical vibrator with the smallest opening on bottom and largest opening on top.	Choose an item.	Choose an item.
5.	Weigh and record the weight of the sample.	Choose an item.	Choose an item.
6.	Place the sample in the mechanical shaker and agitate for 10 minutes.	Choose an item.	Choose an item.
7.	Carefully weigh and record the retained material on each sieve (cumulatively) using the following steps:		
	A. Carefully remove the nest of sieves from the shaker.	Choose an item.	Choose an item.
	B. Remove the top sieve, weigh and record material retained.	Choose an item.	Choose an item.
	C. Remove the next sieve and add the retained material to the material from the first sieve.	Choose an item.	Choose an item.
	D. Record cumulative weight from both sieves.	Choose an item.	Choose an item.
	E. Remove the next sieve and add the retained material to the material from the two previous sieves.	Choose an item.	Choose an item.
	F. Record cumulative weight from all three sieves.	Choose an item.	Choose an item.
	G. Repeat this process for each of the remaining sieves to the catch pan.	Choose an item.	Choose an item.
8.	Verify mass of sample after sieving is within 0.3% of sample mass originally placed on nest of sieves.	Choose an item.	Choose an item.
9.	Calculate the cumulative percent retained for each sieve.	Choose an item.	Choose an item.
10.	Calculate the percent passing for each sieve.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** **(Required if Un-Acceptable)**
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** **(<= 10% per sieve)**	**Un-Acceptable** **(> 10% per sieve)**	**Investigation Notes** **(greater than 10% difference)**

IA Split Sampling Results

	Technician Results	**IA Assessor Results**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Fine Aggregate Loss By Washing- AASHTO T11

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT and AASHTO Standard.	Choose an item.	Choose an item.
	Rapid Drying		
2.	Use metal frame (angle iron) to support standard drying pans a minimum of 4" above gas burner units. Pans may be placed directly on electric heating elements.	Choose an item.	Choose an item.
3.	Uniformly spread sample in pan.	Choose an item.	Choose an item.
4.	For gas drying, adjust flame from burner units to avoid excessive heat directly to bottom of pan.	Choose an item.	Choose an item.
5.	During the drying of the sample, the assessor and Technician shall be present at all times to conduct the following:		
	A. Monitor and adjust the heat, when necessary.	Choose an item.	Choose an item.
	B. Mix, stir, and turn the aggregate over in the pan to prevent scorching of the sample.	Choose an item.	Choose an item.
6.	Dry the sample until no moisture is present. Allow the sample to cool, stirring the sample occasionally to assist in uniform cooling.	Choose an item.	Choose an item.
7.	Process the sample promptly after it is cool to avoid the absorption of additional moisture from the air.	Choose an item.	Choose an item.
	Oven or Air Drying		
8.	The washed aggregate shall be dried to a constant mass at a temperature of 110^0 C (+/- 5^0) or 230^0 F (+/- 9^0).	Choose an item.	Choose an item.
	Fine Aggregate Wash Test Procedure		
9.	Once the sample is dried to a constant mass it is allowed to cool to the touch prior to proceeding with any testing procedures.	Choose an item.	Choose an item.
10.	Split sample until a workable size of 400 to 600 grams is obtained (Note: this sample size deviates from standard AASHTO procedures).	Choose an item.	Choose an item.
11.	Weigh and record weight of sample (Total dry Wt.).	Choose an item.	Choose an item.
12.	Place sample in a container and cover with water to ensure a thorough separation of material finer than the No. 200 sieve from the coarser particles (ex. #8 - #16 plus #200 sieves).	Choose an item.	Choose an item.

13.	Using a large spoon vigorously agitate contents within the container.	Choose an item.	Choose an item.
14.	Immediately pour the wash water over a nest of sieves that are arranged with the coarser sieve on top.	Choose an item.	Choose an item.
15.	Care should be used to avoid pouring the coarse particles out of the container.	Choose an item.	Choose an item.
16.	Add water as previously described and repeat the procedures.	Choose an item.	Choose an item.
17.	Repeat this process until the wash water is clear.	Choose an item.	Choose an item.
18.	All material retained on the nested sieves shall be returned to the washed sample.	Choose an item.	Choose an item.
19.	The washed aggregate shall be dried to a constant mass at a temperature of 110° C (+/- 5° C [230° F (+/- 9° F)]. If using the Rapid Dry method follow the procedures in Exhibit E.	Choose an item.	Choose an item.
20.	Weigh and record weight of the sample (Wt. after washing).	Choose an item.	Choose an item.
21.	Calculate the percent passing the No. 200 sieve.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 6 % Points)	Un-Acceptable (> 6% Points)	Investigation Notes (greater than 6% Points difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Appendix B- Coarse Aggregate Technician Assessment Form

Coarse Aggregate Technician Assessment & IA Split Sampling Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Fine Aggregate Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Stockpile Sampling	Choose an item.	Click or tap here to enter text.
Gradation & Fineness Modulus	Choose an item.	Click or tap here to enter text.
Loss By Washing	Choose an item.	Click or tap here to enter text.

Fine Aggregate IA Split Sampling Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Gradation & Fineness Modulus	Choose an item.	Click or tap here to enter text.
Loss By Washing	Choose an item.	Click or tap here to enter text.

Notes:
Click or tap here to enter text.

Coarse Aggregate Stockpile Sampling
NCDOT IA Assessment

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify all equipment and tools meet all requirements per Standard.	Choose an item.	Choose an item.
2. **Stockpile Sampling**		
G. Obtain the sample from an area that represents material being shipped.	Choose an item.	Choose an item.
H. The sample shall be obtained from an aggregate that has been picked up by a loading unit from the existing stockpile. The material from which the samples are to be obtained should be approximately one full loader bucket.	Choose an item.	Choose an item.
I. The loading unit shall dump the material on the ground as if loading a truck. Care shall be taken not to drop material from an excessive height, which could cause material to segregate. Then, strike off and level to approximately half the original pile height.	Choose an item.	Choose an item.
J. The flat surface shall be divided into four sections. Identify sampling areas as A, B, C, D.	Choose an item.	Choose an item.
K. Opposite quadrants, such as A and D, or B and C shall be used to acquire the sample.	Choose an item.	Choose an item.
L. While obtaining material with the shovel, care shall be taken to prevent spillage of material while transferring material to the sample container.	Choose an item.	Choose an item.
3. **Sample Splitter**		
R. Splitter is resting level on a stable surface.	Choose an item.	Choose an item.
S. Finger gate settings open at least $1^1/_2$ times larger than the materials nominal size to be split.	Choose an item.	Choose an item.
Method A		
T. Place half of the material on the top of the splitter.	Choose an item.	Choose an item.
U. Open the splitter slowly, allowing the material to flow into the two catch pans.	Choose an item.	Choose an item.

V. Switch the pans from one side of the splitter to the other and place the remainder of the material on top of the splitter.	Choose an item.	Choose an item.
W. Open the splitter slowly, allowing the remainder of the material to flow into the two catch pans.	Choose an item.	Choose an item.

Method B

X. Place all the material on the top of the splitter.	Choose an item.	Choose an item.
Y. Open the splitter slowly, allowing the material to flow into the two catch pans.	Choose an item.	Choose an item.
Z. Compare the weights of the two pans to see if they are within 3% of each other.	Choose an item.	Choose an item.
AA. If they are not within this tolerance, place all the material back on top of the splitter and repeat the procedure.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

Note: An IA-Split Sampling is not required for this procedure.

Coarse Aggregate Gradation and Fineness Modulus Method- AASHTO T27

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per the AASHTO Standard.	Choose an item.	Choose an item.
2.	Once the sample is dried to a constant mass, it is allowed to cool to the touch prior to proceeding with any testing procedures.	Choose an item.	Choose an item.
3.	When testing material which 100% passes the ¾ sieve (such as #78, #14M, #9, etc), split the sample into a workable size of 10 to 15 pounds to avoid overloading sieves. Follow procedures for splitting a sample described in Exhibit D.	Choose an item.	Choose an item.
4.	Based on the Specifications for the material being tested, the proper sieves are selected. Additional sieve(s) may be added as needed to determine Fineness Modulus or to prevent sieve overloading.	Choose an item.	Choose an item.
5.	The sieves are placed into the mechanical vibrator with the smallest opening on bottom and largest opening on top.	Choose an item.	Choose an item.
6.	Weigh and record the weight of the sample.	Choose an item.	Choose an item.
7.	Place the sample in the mechanical shaker and agitate for 10 minutes.	Choose an item.	Choose an item.
8.	Carefully remove each sieve, weigh and record the retained material on each sieve (cumulatively) using the following steps:		
	H. Carefully remove the nest of sieves from the shaker.	Choose an item.	Choose an item.
	I. Remove the top sieve, weigh and record material retained.	Choose an item.	Choose an item.
	J. Remove the next sieve and add the retained material to the material from the first sieve.	Choose an item.	Choose an item.
	K. Record cumulative weight from both sieves.	Choose an item.	Choose an item.
	L. Remove the next sieve and add the retained material to the material from the two previous sieves.	Choose an item.	Choose an item.
	M. Record cumulative weight from all three sieves.	Choose an item.	Choose an item.
	N. Repeat this process for each of the remaining sieves to the catch pan.	Choose an item.	Choose an item.
9.	Calculate the cumulative percent retained for each sieve.	Choose an item.	Choose an item.
10.	Calculate the percent passing for each sieve.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** **(Required if Un-Acceptable)**
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** **(<= 10% per sieve)**	**Un-Acceptable** **(> 10% per sieve)**	**Investigation Notes** **(greater than 10% difference)**

IA Split Sampling Results

	Technician Results	**IA Assessor Results**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Coarse Aggregate Loss By Washing- AASHTO T11

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT and AASHTO Standard.	Choose an item.	Choose an item.
	Rapid Drying		
2.	Use metal frame (angle iron) to support standard drying pans a minimum of 4" above gas burner units. Pans may be placed directly on electric heating elements.	Choose an item.	Choose an item.
3.	Uniformly spread sample in pan.	Choose an item.	Choose an item.
4.	For gas drying, adjust flame from burner units to avoid excessive heat directly to bottom of pan.	Choose an item.	Choose an item.
5.	During the drying of the sample, the assessor and Technician shall be present at all times to conduct the following:		
	C. Monitor and adjust the heat, when necessary.	Choose an item.	Choose an item.
	D. Mix, stir, and turn the aggregate over in the pan to prevent scorching of the sample.	Choose an item.	Choose an item.
6.	Dry the sample until no moisture is present. Allow the sample to cool, stirring the sample occasionally to assist in uniform cooling.	Choose an item.	Choose an item.
7.	Process the sample promptly after it is cool to avoid the absorption of additional moisture from the air.	Choose an item.	Choose an item.
	Oven or Air Drying		
8.	The washed aggregate shall be dried to a constant mass at a temperature of 110^0 C (+/- 5^0) or 230^0 F (+/- 9^0).	Choose an item.	Choose an item.
	Clean Coarse Aggregate Wash Test Procedure		
9.	Once the sample is dried to a constant mass it is allowed to cool to the touch prior to proceeding with any testing procedures.	Choose an item.	Choose an item.
10.	Split sample until a workable size of 1,000 to 2,000 grams is obtained (Note: this sample size deviates from standard AASHTO procedures).	Choose an item.	Choose an item.
11.	Weigh and record weight of sample (Total dry Wt.).	Choose an item.	Choose an item.
12.	Place sample in a container and cover with water to ensure a thorough separation of material finer than the No. 200 sieve from the coarser particles.	Choose an item.	Choose an item.

13.	Using a large spoon vigorously agitate contents within the container.	Choose an item.	Choose an item.
14.	Immediately pour the wash water over a nest of sieves that are arranged with the coarser sieve on top.	Choose an item.	Choose an item.
15.	Care should be used to avoid pouring the coarse particles out of the container.	Choose an item.	Choose an item.
16.	Add water as previously described and repeat the procedures.	Choose an item.	Choose an item.
17.	Repeat this process until the wash water is clear.	Choose an item.	Choose an item.
18.	All material retained on the nested sieves shall be returned to the washed sample.	Choose an item.	Choose an item.
19.	The washed aggregate shall be dried to a constant mass at a temperature of 110° C (+/- 5° C [230° F (+/- 9° F)]. If using the Rapid Dry method follow the procedures in Exhibit E.	Choose an item.	Choose an item.
20.	Weigh and record weight of the sample (Wt. after washing).	Choose an item.	Choose an item.
21.	Calculate the percent passing the No. 200 sieve.	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 6% Points)	Un-Acceptable (> 6% Points)	Investigation Notes (greater than 6% Points difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Appendix C-Concrete Technician Assessment Form

Concrete Technician Assessment & IA Split Sampling Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Slump (ASTM C143)	Choose an item.	Click or tap here to enter text.
Air-Pressure Meter (ASTM C231)	Choose an item.	Click or tap here to enter text.
Temperature (ASTM C1064)	Choose an item.	Click or tap here to enter text.
Test Specimens (ASTM C31)	Choose an item.	Click or tap here to enter text.

IA Split Sampling Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Slump (ASTM C143)	Choose an item.	Click or tap here to enter text.
Air-Pressure Meter (ASTM C231)	Choose an item.	Click or tap here to enter text.
Temperature (ASTM C1064)	Choose an item.	Click or tap here to enter text.
Test Specimens (ASTM C31)	Choose an item.	Click or tap here to enter text.

Notes:

Click or tap here to enter text.

Test Method For Slump Of Hydraulic-Cement Concrete- ASTM C143
NCDOT IA Assessment and Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify equipment meets all requirements per ASTM Standard.	Choose an item.	Choose an item.
2. Dampen the interior of the slump mold.	Choose an item.	Choose an item.
3. Place the mold on a rigid, flat, level, moist, nonabsorbent surface, free of vibration, that is large enough to contain all of the slumped concrete.	Choose an item.	Choose an item.
4. Hold the mold firmly in place during filling and cleaning by standing on the two-foot pieces on either side of the mold. A base plate with clamps is also acceptable.	Choose an item.	Choose an item.
5. Using a scoop, fill the mold in three layers, moving the scoop around the perimeter of the mold opening to ensure an even distribution of the concrete. For the first layer:		
A. Fill the mold to approximately 1/3 of its volume (2-5/8")	Choose an item.	Choose an item.
B. Rod the layer 25 times throughout its depth with the rounded end of the tamping rod. Uniformly distribute the strokes over the cross section of the layer. Incline the rod slightly, starting near the perimeter, and progress with vertical strokes spirally toward the center.	Choose an item.	Choose an item.
6. For the second layer:		
A. Fill the mold to approximately 2/3 of its volume (6-1/8")	Choose an item.	Choose an item.
B. Rod the layer 25 times uniformly over the cross section, with the rounded end of the rod. Rod through the layer and into the layer below approximately 1 inch. Uniformly distribute the strokes over the cross section of the layer.	Choose an item.	Choose an item.
7. For the third layer:		

A. Heap concrete above the top of the mold. Choose an item. Choose an item.

B. Rod the layer 25 times uniformly over the cross section, with the rounded end of the rod. Rod through the layer and into the layer below approximately 1 inch. Uniformly distribute the strokes over the cross section of the layer. Choose an item. Choose an item.

C. Should rodding the layer result in the concrete falling below the top of the mold, add concrete to keep an excess above the mold. Continue the rodding count from the value reached before concrete was added to the mold. Choose an item. Choose an item.

8. Strike off the top surface of concrete with the tamping rod in a screeding and rolling motion. Choose an item. Choose an item.

9. While maintaining downward pressure, remove any concrete which collected around the base of the mold during strike off. Choose an item. Choose an item.

10. Immediately remove the mold by raising it in a steady, vertical direction. There should be no lateral or torsional motion of the mold while lifting. Lift the mold off the concrete, a distance of 12 inches, in 5 ± 2 seconds. Choose an item. Choose an item.

11. Complete the slump test, from the start of filling the mold through the removal of the mold, in 2-1/2 minutes. Choose an item. Choose an item.

12. If a decided falling away or shearing off of concrete from one side or portion of the mass occurs, disregard the test and make a new test on another portion of the sample. Choose an item. Choose an item.

13. Immediately measure the slump. This is the vertical distance between the top of the mold and the displaced original center of the top surface of the specimen. Choose an item. Choose an item.

14. Report the slump to the nearest ¼ inch. Choose an item. Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** (<= 1.0")	**Un-Acceptable** (> 1.0")	**Investigation Notes** (Required if Un-Acceptable)

IA Split Sampling Results

	Technician Results (")	**IA Assessor Results (")**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Test Method- Air Content of Freshly Mixed Concrete by the Pressure Method- ASTM C231

NCDOT IA Assessment and Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify equipment meets all requirements per ASTM Standard.	Choose an item.	Choose an item.
2. Dampen the interior of the measuring bowl.	Choose an item.	Choose an item.
3. Using a scoop, place the concrete in the measuring bowl in the required number of layers, moving the scoop around the perimeter of the measuring bowl opening to ensure an even distribution of the concrete.	Choose an item.	Choose an item.
4. For the first layer:		
A. Fill the measuring bowl approximately 1/3 of its volume.	Choose an item.	Choose an item.
B. Rod the layer 25 times, uniformly over the cross section, with the rounded end of the rod. Rod the layer throughout its depth using care not to damage the bottom of the measuring bowl.	Choose an item.	Choose an item.
C. Tap the sides of the measuring bowl smartly 10 to 15 times with the mallet to close any voids left by the tamping rod and to release any large bubbles of air.	Choose an item.	Choose an item.
5. For the second layer:		
A. Fill the measuring bowl to approximately 2/3 of its volume.	Choose an item.	Choose an item.
B. Rod the layer 25 times, uniformly over the cross section, with the rounded end of the rod. Rod through the layer and into the layer below approximately 1 inch.	Choose an item.	Choose an item.
C. Tap the sides of the measuring bowl smartly 10 to 15 times with the mallet to close any voids left by the tamping rod and to release any large bubbles of air.	Choose an item.	Choose an item.
6. For the third layer:		

A. Add concrete in a manner to avoid excessive overfilling. Choose an item. Choose an item.

B. Rod the layer 25 times, uniformly over the cross section, with the rounded end of the rod. Rod through the layer and into the layer below approximately 1 inch. Choose an item. Choose an item.

C. Tap the sides of the measuring bowl smartly 10 to 15 times with the mallet to close any voids left by the tamping rod and to release any large bubbles of air. Choose an item. Choose an item.

7. Using a strike off bar, strike off the top surface by sliding the strike off bar across the top flange or rim of the measuring bowl with a sawing motion until the bowl is just level full. Choose an item. Choose an item.

8. Thoroughly clean the flange/rim of the measuring bowl and cover assembly. Choose an item. Choose an item.

9. Clamp the cover assembly to the measuring bowl ensuring a pressure-tight seal. Choose an item. Choose an item.

10. Close the main air valve between the air chamber and measuring bowl. Open both petcocks on the cover. Choose an item. Choose an item.

11. Use a syringe to inject water through one petcock until water emerges from the opposite petcock. Jar the meter gently until all air is expelled from the opposite petcock. Choose an item. Choose an item.

12. Close the air bleeder valve and pump air into the chamber until the hand on the dial gauge is on the initial pressure line. Allow a few seconds for the compressed air to cool. Choose an item. Choose an item.

13. Stabilize the gauge hand at the initial pressure line by bleeding, pumping, and lightly tapping the gauge by hand. Choose an item. Choose an item.

14. Close both petcocks. Choose an item. Choose an item.

15. Open the main air valve between the air chamber and measuring bowl. Tap the sides of the measuring bowl smartly with the mallet. Lightly tap the pressure gauge by hand to stabilize the gauge hand. Choose an item. Choose an item.

16. Read the percentage of air on the dial of the pressure gauge. Choose an item. Choose an item.

17. Release the main air valve. Release the pressure in the bowl by opening both petcocks before removing the cover. Choose an item. Choose an item.

18. Report the air content to the nearest 0.1% using the aggregate correction factor (if applies). Choose an item. Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** (<= 1.0 %)	**Un-Acceptable** (> 1.0 %)	**Investigation Notes** (Required if Un-Acceptable)

IA Split Sampling Results

	Technician Results (%)	**IA Assessor Results (%)**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Temperature of Freshly Mixed Hydraulic-Cement Concrete- ASTM C1064

NCDOT IA Assessment and Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify equipment meets all requirements per ASTM Standard.	Choose an item.	Choose an item.
2. Place the temperature measuring device in the concrete so the sensing portion is submerged a minimum of 75mm (3in)	Choose an item.	Choose an item.
3. Gently press concrete around the TMD so that ambient (outside) air Temperature does not influence the measured temperature.	Choose an item.	Choose an item.
4. Leave the TMD in the concrete for at least 2 minutes but not more than 5 minutes.	Choose an item.	Choose an item.
5. Read and record the fresh concrete temperature to the nearest 0.5° C (1° F). Do not remove the TMD from the concrete when reading the temperature.	Choose an item.	Choose an item.
6. Report the measured temperature of the freshly mixed concrete to the nearest 0.5°C (1°F).	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** (<= 3°)	**Un-Acceptable** (> 3°)	**Investigation Notes** (Required if Un-Acceptable)

IA Split Sampling Results

	Technician Results (°F)	**IA Assessor Results (°F)**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Test Method For Making and Curing Concrete Test Specimens (4”X 8”) in the Field-ASTM C31

NCDOT IA Assessment and Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify test specimen molds meet all requirements per ASTM Standard.	Choose an item.	Choose an item.
2. Using a scoop, place the concrete in the mold in the required number of layers, moving the scoop around the perimeter of the mold opening to ensure an even distribution of the concrete.	Choose an item.	Choose an item.
3. For the first layer:		
A. Fill the mold with the appropriate quantity of concrete: approximately ½ the volume for a 4"X8" mold.	Choose an item.	Choose an item.
B. Rod the layer 25 times, uniformly over the cross section, with the rounded end of the rod. Rod the layer throughout its depth using care not to damage the bottom of the mold.	Choose an item.	Choose an item.
C. Use an open hand to tap cylinder molds that are susceptible to denting or other permanent distortion if tapped with a mallet.	Choose an item.	Choose an item.
4. For the second layer:		
A. Fill the mold with the appropriate quantity of concrete: fill a 4"X8" mold to the top.	Choose an item.	Choose an item.
B. Rod the layer 25 times, uniformly over the cross section, with the rounded end of the rod. Rod through the layer and into the layer below approximately 1 inch.	Choose an item.	Choose an item.
C. Use an open hand to tap cylinder molds that are susceptible to denting or other permanent distortion if tapped with a mallet.	Choose an item.	Choose an item.
5. During the consolidation of the top layer, adjust the concrete level of underfilled and overfilled molds, if necessary.	Choose an item.	Choose an item.
6. Strike off any excess concrete with the tamping rod, or with a handheld float or trowel if appropriate, to produce a flat even surface.	Choose an item.	Choose an item.
7. Provide protection to prevent sample moisture loss.	Choose an item.	Choose an item.

8. Mark the specimen to identify the concrete it represents and move the Specimens to an initial curing place for storage. Choose an item. Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** (<= 500 psi)	**Un-Acceptable** (> 500 psi)	**Investigation Notes** (Required if Un-Acceptable)

IA Split Sampling Results

	Technician Results (psi)	**IA Assessor Results (psi)**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Appendix D – QMS Asphalt Roadway Technician Assessment Form

QMS Asphalt Roadway Technician- Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Asphalt Roadway Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Nuclear Density Testing (M&T 901 QC/QA -N)	Choose an item.	Click or tap here to enter text.

Asphalt Roadway Technician IA Split Sampling Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Nuclear Density Testing (M&T 901 QC/QA-N)	Choose an item.	Click or tap here to enter text.

Notes:

Click or tap here to enter text.

Nuclear Density Testing- M&T 901 QC/QA-N

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meets all requirements per M&T Standard.	Choose an item.	Choose an item.
2.	Verify the Technician has a valid certification.	Choose an item.	Choose an item.
3.	The nuclear gauge was set in proper unit of measurement.	Choose an item.	Choose an item.
4.	The Standard Count taken was specified (observe Standard Count set-up and question technician on requirements).	Choose an item.	Choose an item.
5.	The Depth Strip was properly calibrated (3450 model only).	Choose an item.	Choose an item.
6.	The nuclear gauge was set in proper test mode (3450 model only).	Choose an item.	Choose an item.
7.	The nuclear gauge was set in proper count time.	Choose an item.	Choose an item.
8.	The correct target density was utilized and the calculations were correct.	Choose an item.	Choose an item.
9.	The proper lift thickness was utilized.	Choose an item.	Choose an item.
10.	The correct minimum specified density requirement for the mix was being utilized.	Choose an item.	Choose an item.
11.	The Control Strip performed was within the specified time period.	Choose an item.	Choose an item.
12.	The Test Section Standard Count was within tolerance of the Control Strip Standard Count.	Choose an item.	Choose an item.
13.	The Source Rod was placed in the proper measurement position.	Choose an item.	Choose an item.

14.	The nuclear gauge was properly positioned and seated when taking a reading.	Choose an item.	Choose an item.
15.	The count time was completely elapsed prior to the technician pulling the source rod into the safe position (monitor carefully).	Choose an item.	Choose an item.
16.	Record the original test results (%):	Choose an item.	Choose an item.
17.	Record the observed re-test results (%):	Choose an item.	Choose an item.
18.	The test results from the original reading and observed re-test were within specified tolerance of 1.5% (if "Fail" conduct investigation).	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** (<= 10%)	**Un-Acceptable** (> 10%)	**Investigation Notes** (greater than 10% difference)

IA Split Sampling Results

	Technician Results (%)	**IA Assessor Results (%)**	**Correlation Results**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Appendix E- Asphalt QC Lab Technician Assessment Form

Asphalt Mix QC Laboratory- Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Asphalt QC Laboratory Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Sampling & Quartering	Choose an item.	Click or tap here to enter text.
Binder Content (T-308)	Choose an item.	Click or tap here to enter text.
Bulk Specific Gravity (T-312 and T-166/T-331)	Choose an item.	Click or tap here to enter text.
Theoretical Maximum Specific Gravity (T-209 or D-6857)	Choose an item.	Click or tap here to enter text.
Recovered Aggregate Gradation (T-30)	Choose an item.	Click or tap here to enter text.

Asphalt QC Laboratory IA Split Sampling Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Binder Content (T-308)	Choose an item.	Click or tap here to enter text.
Bulk Specific Gravity (T-312 and T-166/T-331)	Choose an item.	Click or tap here to enter text.
Theoretical Maximum Specific Gravity (T-209 or D-6857)	Choose an item.	Click or tap here to enter text.
Recovered Aggregate Gradation (T-30)	Choose an item.	Click or tap here to enter text.

Notes:

Click or tap here to enter text.

Sampling Mix from the Truck & Reduction of Samples to Test Size
NCDOT IA Assessment

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

	Procedure	**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per Standard.	Choose an item.	Choose an item.
2.	Initial point of sampling established at the high point of the cone near the middle of the truck box.	Choose an item.	Choose an item.
3.	At least three incremental sampling points established and equally spaced around the load?	Choose an item.	Choose an item.
4.	Mix temperature taken from truck as required by Section 7.5.5?	Choose an item.	Choose an item.
5.	Upper 6 - 12 inches of mix removed before extracting mix samples?	Choose an item.	Choose an item.
6.	Material from each sampling point placed into each bucket/cloth bag?	Choose an item.	Choose an item.
7.	Each bucket/cloth bag contains a minimum of 50 pounds of mix?	Choose an item.	Choose an item.
8.	Material to be retained carefully placed in cloth bags? **(QC only)**	Choose an item.	Choose an item.
	The following 3 items should be administered Orally to ensure technician is aware of requirements:	Choose an item.	Choose an item.
	a. A WHITE sample card should be used to tag which bags? [QA Sample Bag]	Choose an item.	Choose an item.
	b. An ORANGE sample card should be used to tag which bags? [Referee Bag]	Choose an item.	Choose an item.
	c. All bags retained for 7 calendar days in a safe, dry place as required by the QMS Manual?	Choose an item.	Choose an item.
9.	Mix to be tested should be emptied onto the splitting table and shaped into a conical pile? Carefully flatten the conical pile to a uniform thickness and diameter by pressing down the apex?	Choose an item.	Choose an item.
10.	Mix quartered with quarters used to weigh up samples for Gyratory Specimens, Rice Gravity, Binder Content, and Gradation testing as required in Section 7.5?	Choose an item.	Choose an item.
11.	Any remaining mix from each quarter discarded after weighing up samples?	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** **(Required if Un-Acceptable)**
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

Note: An IA-Split Sampling is not required for “Sampling and Quartering”.

Asphalt Binder Content of Asphalt Mix by the Ignition Method- NCDOT T-308

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT T-308 Standard.	Choose an item.	Choose an item.
2.	Minimum weight of sample based on the following:	Choose an item.	Choose an item.

Nominal Max Particle Size (mm)	Minimum Weight of Sample (grams)
25.0	3000
19.0	2000
9.50, 4.75	1200

3.	Sample size not more than 500 grams greater than the minimum weight of sample?	Choose an item.	Choose an item.
4.	Ignition Furnace preheated to 1000 °F (538 °C)?	Choose an item.	Choose an item.
5.	Calibration Factor entered for the specific mix to be tested?	Choose an item.	Choose an item.
6.	Weight of specimen basket assembly recorded (including catch pan, lids, and guards)?	Choose an item.	Choose an item.
7.	Sample evenly distributed in baskets, material kept away from edges (not touching sides), and leveled?	Choose an item.	Choose an item.
8.	Total weight of sample and specimen basket assembly recorded?	Choose an item.	Choose an item.
9.	Initial weight of the sample calculated and recorded?	Choose an item.	Choose an item.
10.	Initial weight of the sample input into the ignition furnace controller and then verified?	Choose an item.	Choose an item.
11.	Sample and specimen basket assembly placed in the furnace and chamber door closed?	Choose an item.	Choose an item.
12.	Internal balance reading and chamber temperature allowed to stabilize?	Choose an item.	Choose an item.
13.	Internal balance reading agrees with total weight within ± 5 grams? Note: Record weight BEFORE pressing the Start button.	Choose an item.	Choose an item.
14.	Pressing the start button locks the chamber door and starts the combustion blower?	Choose an item.	Choose an item.
15.	Test continued until stable light and audible alarm indicate the test is complete? Note: Change in weight does not exceed 0.01% for three consecutive minutes	Choose an item.	Choose an item.

16.	Pressing the Stop button unlocks the chamber door and prints the ticket?	Choose an item.	Choose an item.
17.	Open the chamber door, remove the specimen basket assembly, and place it on a cooling plate or block, and allow it to cool (see T30 Item #1)?	Choose an item.	Choose an item.
18.	Corrected asphalt content (%) from the ticket recorded?	Choose an item.	Choose an item.
19.	Contents of sample basket assembly emptied into a pan without any loss of material before gradation analysis is performed?	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 1.0%)	Un-Acceptable (> 1.0%)	Investigation Notes (greater than 10% difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Bulk Specific Gravity (T-312 & T-166/T-331)

Preparing Asphalt Specimens by means of the Superpave Gyratory Compactor- NCDOT T-312

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure	**1st Trial**	**2nd Trial**
1. Verify all equipment and tools meet all requirements per NCDOT T-312 Standard.	Choose an item.	Choose an item.
2. Main power of gyratory compactor switched on for manufacturer's recommended warm-up period?	Choose an item.	Choose an item.
3. Daily Height Verification run, Required Angle, Pressure, and Number of Gyrations set?	Choose an item.	Choose an item.
4. Three gyratory mold assemblies placed in an oven set at *300 ± 25 °F (149 ± 14 °C)* for a minimum of 30 minutes prior to estimated beginning of compaction?	Choose an item.	Choose an item.
5. Appropriate amount of mix weighed out to produce a compacted specimen height of 115 ± 5 mm?	Choose an item.	Choose an item.
6. Mix Sample Compaction Temperature (ALL Binder Grades) 10 °F lower than the Mixing temperature shown on the JMF, and then apply a range of ± 5 °F.	Choose an item.	Choose an item.

Mixes Using Binder Grade	***Compaction Temperature***
PG 58-28 & PG 64-22 (290°F)	*280 ± 5 °F (137 ± 3 °C)*
PG 70-22 (305°F)	*295 ± 5 °F (146 ± 3 °C)*
PG 76-22 (325°F)	*315 ± 5 °F (157 ± 3 °C)*

***RAP/RAS** - temperature based on Original binder grade for mix type?*

***WMA** – required compaction temperature is 10 °F lower than mixing temperature (range = ±5 °F)?*

7. Mold assembly removed from oven and paper disc placed in bottom of mold?	Choose an item.	Choose an item.
8. Mix sample introduced into mold in one lift and leveled?	Choose an item.	Choose an item.
9. Mix temperature checked by placing a thermometer in the center of the specimen?	Choose an item.	Choose an item.
10. Once compaction temperature is reached, paper disc placed on top of material and mold assembly loaded into compactor?	Choose an item.	Choose an item.
11. Are the procedures in #6 - #9 above done as quickly as possible to prevent mix from cooling below the required compaction temperature?	Choose an item.	Choose an item.
12. Were the correct gyrations used for the mix type being gyrated? Make sure to look at the JMF # to see if it is the New 2018 Specs or a 2017 or older JMF.	Choose an item.	Choose an item.

13.	Once compaction is complete, mold assembly is removed, and specimen carefully extruded? Note: Some mix types may require a cooling period of 5 - 10 mins. before complete extrusion.	Choose an item.	Choose an item.
14.	All paper protection discs are removed from specimens as soon as possible?	Choose an item.	Choose an item.
15.	Before reusing mold, mold placed back into an oven set at compaction temperature for a minimum of 5 minutes?	Choose an item.	Choose an item.
16.	All 3 specimens are placed in front of cooling fan until they cool to a temperature of 77 ± 9 ºF?	Choose an item.	Choose an item.
17.	Specimens are properly identified with appropriate sample numbers?	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 0.060)	Un-Acceptable (> 0.060)	Investigation Notes (greater than 0.060 difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Bulk Specific Gravity (T-312 & T-166/T-331)

Bulk Specific Gravity of Compacted Asphalt Mixtures- NCDOT T-166

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

	Procedure	**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT T-166 Standard.	Choose an item.	Choose an item.
2.	Laboratory – molded specimens?		
	Cooled to temperature of 77 ± 9 °F (25 ± 5 °C)?	Choose an item.	Choose an item.
3.	Cored or cut samples?		
	a. Sample dried to constant weight at a temperature of 125 ± 5 °F (52 ± 3 °C) until further drying does not alter the weight by more than 0.05% when weighed at 2-hour intervals?	Choose an item.	Choose an item.
	b. Samples saturated with water initially dried overnight in oven at a temperature of 125 ± 5 °F (52 ± 3 °C) and then weighed at 2-hour intervals?	Choose an item.	Choose an item.
	c. Core-Drying Apparatus: Sample weighed, run one complete cycle, reweighed, and drying continued until further drying does not alter the weight by more than 0.05%. (At least 2 cycles.)	Choose an item.	Choose an item.
4.	Core-Drying Apparatus		
	a. Specimen placed inside vacuum chamber and lid(s) placed on chamber and moisture trap (if necessary)?	Choose an item.	Choose an item.
	b. Start button pressed to begin the drying process?	Choose an item.	Choose an item.
	c. Machine automatically stops when it senses the “dry specimen condition”? (At least 2 cycles.)	Choose an item.	Choose an item.
5.	Dry Weight determined to nearest 0.1 gram?	Choose an item.	Choose an item.
6.	Wet Weight determined to nearest 0.1 gram?	Choose an item.	Choose an item.
	a. The water tank Circulation Pump Shall NOT be in use while recording sample weights?	Choose an item.	Choose an item.
	b. Immersed for 4 ± 1 minute?	Choose an item.	Choose an item.
	c. Water Bath temperature at 77 ± 2 °F (25 ± 1 °C)?	Choose an item.	Choose an item.
7.	Saturated Surface-Dry Weight determined to nearest 0.1 gram?	Choose an item.	Choose an item.
	a. Quickly blotted with damp towel?	Choose an item.	Choose an item.

Note: Entire towel is saturated and water is wrung out until no more water can be wrung from the towel?

b. The entire operation did not exceed 25 seconds? Choose an item. Choose an item.

(Note: timing begins once the specimen breaks the surface of the water and ends once the blotted specimen is placed on the top of the balance.)

8. Bulk Specific Gravity (G_{mb}) calculated to the nearest 0.001 as follows: Choose an item. Choose an item.

$$G_{mb} = \frac{A}{(B-C)}$$

Where A = Weight of dry specimen in air (grams)
B = Weight of saturated surface dry specimen in air (grams)
C = Weight of specimen in water (grams)

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 0.060)	Un-Acceptable (> 0.060)	Investigation Notes (greater than 0.060 difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Bulk Specific Gravity (T-312 & T-166/T-331)

Bulk Specific Gravity (Gmb) of Asphalt Paving Mixtures by Vacuum Sealing Method- NCDOT T-331

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

	Procedure	**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT T-331 Standard.	Choose an item.	Choose an item.
2.	Specimens laboratory molded – allowed to cool to temperature 77 ± 9^0 F (25 ± 5^0 C)	Choose an item.	Choose an item.
3.	Cored or cut samples?		
	a. Sample dried to constant weight at a temperature of 125 ± 5°F (52 ± 3°C) until further drying does not alter the weight by more than 0.05% when weighed at 2-hour intervals?	Choose an item.	Choose an item.
	b. Samples saturated with water initially dried overnight in oven at a temperature of 125 ± 5°F (52 ± 3°C) and then weighed at 2-hour intervals?	Choose an item.	Choose an item.
	c. Automatic Drying Apparatus: Sample weighed, run one complete cycle, reweighed, and drying continued until further drying does not alter the weight by more than 0.05%. (At least 2 cycles.)	Choose an item.	Choose an item.
4.	Appropriate size plastic bag chosen for the specimen size being tested and weight determined?	Choose an item.	Choose an item.
5.	Weight of empty bag determined?	Choose an item.	Choose an item.
6.	Dry Weight of specimen determined to nearest 0.1 gram?	Choose an item.	Choose an item.
7.	Bag placed on top of Specimen Sliding Plate inside the vacuum chamber?	Choose an item.	Choose an item.
8.	Specimen placed in bag carefully to avoid puncturing, dropping, or impacting the bag?	Choose an item.	Choose an item.
9.	Vacuum chamber set to proper Manufacturer's Program (Program # 1)?	Choose an item.	Choose an item.
10.	Bag automatically sealed by the Vacuum Chamber once air is removed?	Choose an item.	Choose an item.
11.	Air exhausted into the chamber until chamber door opens indicating atmospheric pressure within the chamber?	Choose an item.	Choose an item.
12.	Bag inspected for loose areas, to insure a proper seal? If loose areas found, was sealing restarted?	Choose an item.	Choose an item.
13.	Was the sample immediately transferred to water bath (with scale) at 77 ± 2°F (25 ± 1°C)? The time between the lid opening after sealing and inspection of the bag and placement of the specimen into the water tank should not exceed one (1) minute?	Choose an item.	Choose an item.

14.	Weight of the sealed sample in water determined at 77° ± 2°F (25° ± 1°C) to the nearest 0.1 gram?	Choose an item.	Choose an item.
15.	The water tank Circulation Pump Shall NOT be in use while recording sample weights?	Choose an item.	Choose an item.
16.	Specimen removed from bag and its weight determined to the nearest 0.1 gram?	Choose an item.	Choose an item.
	a. Was weight verified to be within ±5 grams of weight?	Choose an item.	Choose an item.
	b. If not, was the specimen dried & retested with a new bag?	Choose an item.	Choose an item.
17.	Bulk Specific Gravity (G_{mb}) calculated to the nearest 0.001 as follows:	Choose an item.	Choose an item.

$$Gmb = \frac{A}{[C + (B - A)] - E - \left[\frac{(B - A)}{F}\right]}$$

Where
A = Weight of dry specimen in air (grams)
B = Weight of sealed specimen in air (grams)
C = Weight of dry specimen in air - reweighed (grams)
E = Weight of sealed specimen under water - reweighed (grams)
F = Bag correction factor

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 0.060)	Un-Acceptable (> 0.060)	Investigation Notes (greater than 0.060 difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Theoretical Maximum Specific Gravity (T-209 or D-6857)

Maximum Specific Gravity (G_{mm}) of Asphalt Mixtures- NCDOT T-209

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT T-209 Standard.	Choose an item.	Choose an item.
2.	Sample of 1500g (9.5, 4.75) OR 2000g (25.0, 19.0) weighed into appropriately sized container? Sample size not more than 200 grams greater than the minimum sample weight?	Choose an item.	Choose an item.
3.	Mix spread uniformly in large flat pan and broken up so that no particles of fine aggregate portion larger than 1/4 inch?	Choose an item.	Choose an item.
4.	Sample cooled to temperature of 77 ± 9 °F (25 ± 5 °C) and then the entire amount placed in the bowl or pot and weighed?	Choose an item.	Choose an item.
5.	Water at 77 ± 2 °F (25 ± 1 °C) added until sample is covered completely?	Choose an item.	Choose an item.
6.	Entrapped air removed using partial vacuum of 27.5 ± 2.5 mm Hg for 15 ± 2 minutes? Container and contents agitated continuously by mechanical device?	Choose an item.	Choose an item.
7.	At the end of the vacuum period, was the vacuum released by increasing the pressure at a rate not to exceed 60 mm Hg (8 kPa) per second?	Choose an item.	Choose an item.
8.	Bowl/Pot Determination:		
	a. Bowl and sample suspended in water maintained at 77 ± 2 °F (25 ± 1 °C) for 10 ± 1 minutes?	Choose an item.	Choose an item.
	b. Net weight of sample in water determined?	Choose an item.	Choose an item.
	c. The water tank Circulation Pump Shall NOT be in use while recording sample weights?	Choose an item.	Choose an item.
9.	Maximum Specific Gravity (G_{mm}) calculated to the nearest 0.001 as follows:	Choose an item.	Choose an item.

$$G_{mb} = \frac{A}{(A - C)}$$

Where

A = Weight of sample in air before vacuum (grams)

C = Weight of sample in water after vacuum (grams)

Dryback Procedure

10.	Water drained from sample and decanted through a towel or No. 200 sieve to prevent loss of fine particles?	Choose an item.	Choose an item.
11.	Large conglomerations of mix broken up by hand?	Choose an item.	Choose an item.

12. Sample spread in a tared pan and placed in front of an electric fan to remove surface moisture? Choose an item. Choose an item.

13. Sample stirred periodically? Choose an item. Choose an item.

14. Sample weighed at 15-minute intervals until constant weight is reached? Choose an item. Choose an item.

(Note: Constant weight is reached once loss is less than 0.05% for the 15-minute interval.)

15. Maximum Specific Gravity (G_{mm}) calculated to the nearest 0.001 as follows: Choose an item. Choose an item.

$$G_{mb} = \frac{A}{(B - C)}$$

Where A = Weight of sample in air before vacuum (grams);
B = Weight of surface dry sample in air after vacuum or after Dryback (grams);
C = Weight of sample in water after vacuum (grams)

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 0.040)	Un-Acceptable (> 0.040)	Investigation Notes (greater than 0.040 difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Theoretical Maximum Specific Gravity (T-209 or D-6857)

Maximum Specific Gravity (G_{mm}) of Asphalt Mixtures by Vacuum Sealing- NCDOT D-6857

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

Procedure		**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT D-6857 Standard.	Choose an item.	Choose an item.
2.	Sample of 1500g (9.5, 4.75) OR 2000g (25.0, 19.0) weighed into appropriately sized container? Sample size not more than 200 grams greater than the minimum sample weight?	Choose an item.	Choose an item.
3.	Mix spread uniformly in large flat pan and broken up so that no particles of fine aggregate portion larger than 1/4 inch?	Choose an item.	Choose an item.
4.	Sample cooled to temperature of 77 ± 9 °F (25 ± 5 °C)?	Choose an item.	Choose an item.
5.	Dry Weight of specimen determined?	Choose an item.	Choose an item.
6.	Vacuum chamber set to proper Manufacturer's Program (Program # 2)?	Choose an item.	Choose an item.
7.	An appropriate internal and external bag chosen and the Combined Weight determined?	Choose an item.	Choose an item.
8.	The entire sample placed in the internal bag, with care taken to ensure that none of the sample is lost during the transfer?	Choose an item.	Choose an item.
9.	The empty external bag placed inside the vacuum chamber?	Choose an item.	Choose an item.
10.	The internal bag containing the sample placed with the channel side down into the external bag?	Choose an item.	Choose an item.
11.	The sample spread so that it is evenly distributed within the internal bag?	Choose an item.	Choose an item.
12.	The opening of the internal bag is pushed away from the opening of the external bag to prevent the opening of the internal bag from being sealed?	Choose an item.	Choose an item.
13.	The opening of the external bag is placed over the seal bar, ensuring that the internal bag is not over the seal bar?	Choose an item.	Choose an item.
14.	The Vacuum Chamber closed and allowed to remove air from chamber and bag?	Choose an item.	Choose an item.
15.	The external bag automatically sealed by the Vacuum Chamber once air is removed?	Choose an item.	Choose an item.
16.	Air exhausted into the chamber until chamber door opens indicating atmospheric pressure within the chamber?	Choose an item.	Choose an item.
17.	Sealed sample removed from the vacuum chamber and bag inspected for loose areas, to insure a proper seal? If loose areas found, was sealing restarted?	Choose an item.	Choose an item.

18.	Was the sample immediately transferred to water tank (with scale) at 77 ± 2°F (25 ± 1°C)? Note: The time between the lid opening after sealing and inspection of the bag and placement of the specimen into the water tank should not exceed one (1) minute.	Choose an item.	Choose an item.
19.	The water tank Circulation Pump Shall NOT be in use while recording sample weights?	Choose an item.	Choose an item.
20.	Was the sealed bag containing the sample submerged completely under water and the external bag cut open all the way across the top, leaving approximately 1 inch intact?	Choose an item.	Choose an item.
21.	When cutting the bag open, was ALL of the bag kept completely underwater throughout the entire process?	Choose an item.	Choose an item.
22.	Were both bags opened and held open for 10 - 15 seconds to allow water to flow into the bags?	Choose an item.	Choose an item.
23.	Was the sample secured over the suspended holder and care taken to ensure the bags nor the suspension equipment are contacting the sides or bottom of the water tank?	Choose an item.	Choose an item.
24.	Was water level returned to constant water level?	Choose an item.	Choose an item.
25.	Was the weight allowed to stabilize, and the weight of the mix and bags underwater recorded to the nearest 0.1 gram?	Choose an item.	Choose an item.
26.	Maximum Specific Gravity (G_{mm}) calculated to the nearest 0.001 per the manufacturer-provided software or data collection table?	Choose an item.	Choose an item.

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 0.040)	Un-Acceptable (> 0.040)	Investigation Notes (greater than 0.040 difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Sieve Analysis of Recovered Aggregate Gradation- NCDOT T-30

NCDOT IA Assessment & Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#: Click or tap here to enter text.

	Procedure	**1st Trial**	**2nd Trial**
1.	Verify all equipment and tools meet all requirements per NCDOT T-30 Standard.	Choose an item.	Choose an item.
2.	Sample consists of all aggregate from ignition oven burn and has been cooled to 120 °F (49 °C) or less prior to washing?	Choose an item.	Choose an item.
3.	Material weighed to nearest 0.1 gram?	Choose an item.	Choose an item.
4.	Sample placed in container and covered with water?	Choose an item.	Choose an item.
5.	Wetting Agent added?	Choose an item.	Choose an item.
6.	Contents of container agitated vigorously? OR If automatic aggregate washer used, was agitation limited to a maximum of 10 minutes?	Choose an item.	Choose an item.
7.	Wash water poured over nest of TWO sieves (No. 16 over a No. 200 sieve)?	Choose an item.	Choose an item.
8.	Care taken to avoid decantation of coarser particles? No. 200 sieve not overflowed or overloaded?	Choose an item.	Choose an item.
9.	Washing continued until wash water is clear?	Choose an item.	Choose an item.
10.	All material retained on nested sieves flushed back into container (NOT onto the No. 200 sieve)?	Choose an item.	Choose an item.
11.	Washed aggregate dried to constant weight in an oven (or a hot plate) set at a temperature between 220 – 325°F (105 – 163°C)?	Choose an item.	Choose an item.
12.	Material cooled to 120 °F (49 °C) or less after drying?	Choose an item.	Choose an item.
13.	Material weighed to nearest 0.1 gram?	Choose an item.	Choose an item.
14.	Material shaken on specified sieves for 10 minutes (including No. 200)?	Choose an item.	Choose an item.
15.	Each fraction of aggregate weighed cumulatively, including minus No. 200?	Choose an item.	Choose an item.
16.	Does final total weight after sieving check within 0.2% of total weight after washing?	Choose an item.	Choose an item.
17.	Sizes larger than No. 200 reported to nearest whole percent (1.0)?	Choose an item.	Choose an item.
18.	Minus No. 200 reported to nearest 0.1 percent?	Choose an item.	Choose an item.

Sieve Analysis of Recovered Aggregate Gradation - NCDOT T-30 (Continued)

Technician Assessor Name: Click or tap here to enter text. **Assessment Date:** Click or tap to enter a date.
IA Sampling Assessor Name: Click or tap here to enter text. **IA Sampling Date:** Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	Results	Investigation Notes (Required if Un-Acceptable)
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	Acceptable (<= 3.0%)	Un-Acceptable (> 3.0%)	Investigation Notes (greater than 3.0% difference)

IA Split Sampling Results

	Technician Results	IA Assessor Results	Correlation Results
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Appendix F – Soil Density

Technician Assessment Form

Soil Density Technician Assessment & IA Split Sampling- Summary Sheet

Technician Name: Click or tap here to enter text.

Technician ID#: Click or tap here to enter text.

Technician Assessor Name: Click or tap here to enter text.

Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text.

IA Sampling Date: Click or tap to enter a date.

HiCAMS #: Click or tap here to enter text.

Technician Assessment Results

Test Procedure	**Assessment Results**	**Investigation Notes (Required if Un-Acceptable)**
Conventional Density	Choose an item.	Click or tap here to enter text.

IA Split Sampling Results

Test Procedure	**Sampling Results**	**Investigation Notes (Required if Un-Acceptable)**
Conventional Density	Choose an item.	Click or tap here to enter text.

Notes:
Click or tap here to enter text.

Conventional Density (Test 1A)- AASHTO T99
NCDOT IA Assessment and Split Sampling

Technician Name: Click or tap here to enter text. Technician ID#:Click or tap here to enter text.

Procedure	1st Trial	2nd Trial
1. Verify equipment meets all requirements per AASHTO Standard.		
2. Verify the length of test section was determined and calculations correct.		
3. Empty mold and collar reading to 4psi.		
4. Place the Volume Meter on plate, scribe around the plate edge and mark valve location.		
5. Verify a flat reading of 4psi.		
6. Remove all the material from the test hole and place into a sample pan, confirm all material is in pan.		
7. Determine hole size, allowable measures are: .03200 - .03500 ft^3 or 910 – 990 cm^3.		
8. Verify the hole reading is 4 psi.		
9. Verify soil residue for any rock is broken down and/or incorporated into second layer.		
10. If judgement factors are incorporated, apply now.		
11. Soil shall be divided into three equal parts.		
12. Compact soil into mold on top of 50lb. weight or approved platform.		
13. Compact soil into mold in three equal layers and apply 25 blows per layer, stopping on the third layer at 18 blows and scribe around the inside of mold, apply the final 7 remaining blows.		
14. Verify the mold with soil is reading 4 psi.		
15. Determine the % compaction.		

Technician Assessor Name: Click or tap here to enter text. Assessment Date: Click or tap to enter a date.

IA Sampling Assessor Name: Click or tap here to enter text. IA Sampling Date: Click or tap to enter a date.

Technician Assessment Requirements

To successfully complete each step in the above procedure within two trials.

Technician Assessment Results

Technician Assessment	**Results**	**Investigation Notes** **(Required if Un-Acceptable)**
Trial 1	Choose an item.	Click or tap here to enter text.
Trial 2	Choose an item.	Click or tap here to enter text.

IA Split Sampling Requirements

Correlation	**Acceptable** **(<= 5.0%)**	**Un-Acceptable** **(> 5.0%)**	**Investigation Notes** **(Required if Un-Acceptable)**

IA Split Sampling Results

	Technician Results (%)	**IA Assessor Results (%)**	**Correlation Results**	**Investigation Notes**
Trial 1	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.
Trial 2	Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.