



INDEPENDENT ASSURANCE MANUAL

Manual 5-691

Procedures in reviewing and reporting testing equipment, calibrations,
and individuals testing competencies per FHWA 23 CFR 637

June 2017

ISSUED BY:

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OFFICE of CONSTRUCTION and INNOVATIVE CONTRACTING

DIVISION OF OPERATIONS:
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Implementation of 2016 MnDOT Independent Assurance Manual

This Manual is effective upon review and acceptance by the Minnesota Department of Transportation management and the Federal Highway Administration.

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100 Introduction

100.1 Development

This Independent Assurance (IA) Manual replaces the Minnesota Department of Transportation (MnDOT) document *MnDOT Sampling and Testing Program*, dated May 1992. This Manual, along with MnDOT 5-591 *Contract Administration Manual*, constitutes the procedures followed by the MnDOT IA program.

Personnel from MnDOT's IA program, Office of Construction and Innovative Contracting (OCIC), Office of Materials and Road Research (OM&RR), and District Materials Engineers (DME) and Federal Highway Administration (FHWA) have developed, reviewed, and approved this Manual. This Manual contains the guidelines for IA activities on roadway construction projects.

This most current version of the MnDOT IA Manual is available online at www.dot.state.mn.us/materials/labiaast.html.

100.2 Summary

This Manual establishes MnDOT's IA program a subpart of MnDOT's Quality Assurance program. The manual will provide an overview of the program's objectives and major components including:

- IA staff qualifications
- Quality Control/Quality Assurance (QC/QA) tester and lab certifications
- Certified tester training
- Test equipment calibration
- Project documentation and reporting, annual FHWA reporting
- Lab/field materials out-of-tolerance investigation process
- Tolerance: IA disagreement resolution process (third party) suspension, revocation, appeals.

This Manual is intended as a program outline for the Independent Assurance Inspectors (IAI) and the numerous Stakeholders they serve. The material is comprised of technical information from various MnDOT Manuals including Specialty Units (Concrete, Bituminous, and Grading & Base), the Contract Administration Manual, Laboratory Manual, and other guides regarding equipment calibration, sampling and testing procedures.

The intent of the Manual is to act as a reference for the IAIs during their daily field operations to bring consistency and uniformity to the application of the IA program

statewide. Some of the definitions and responsibilities outlined in this Manual have been elaborated upon to help individuals unfamiliar with the process learn, understand, and administer the IA program.

An overview of the procedures and reporting requirements for each program component are described in individual sections below.

- **Section 100**

The introduction section discusses how the IA Manual was developed and includes an overview of the Manual and MnDOT's IA program.

- **Section 200**

This section list the roles and responsibilities of the Independent Assurance Inspector Group (IAIG) as they relate to Testers, OCIC, Office of Materials, Districts/Metro, Local Public Agencies (LPAs), and Consultants. Including the federal regulations pertaining to the Quality Assurance Program as it relates to QC/QA and IA

- **Section 300**

This section lists the IA program objectives including roles and responsibilities of the stakeholders involved in the Acceptance program.

- **Section 400**

This section describes the seven individual components of the IA program: IA staff qualification, QC/QA tester & lab certification, certified tester training, test equipment calibration, project documentation and reporting, annual FHWA reporting, lab/field tolerance investigations, and the IA disagreement resolution process. An overview, the procedures, and reporting requirements for each program component are described in detail in individual subsections.

- **Section 500**

This section describes the process and steps in the IA lab/field tolerance-disagreement resolution process, used uniformly across the State when parties involved cannot come to agreement. The IA re-reviews for lab/field tolerance, process to follow when out-of-tolerances are ongoing. Investigation, Third-party involvement, suspension/revocations.

- **Section 600**

APPENDICES:

IA phone list

Acronyms and Definitions

Code of Federal Regulations (CFR) 23 Part 637, Subpart B - Quality Assurance Procedures for Construction.

IAST Job Field Guide

100.3 **IA Manual Customer Feedback**

MnDOT IA program staff would like feedback regarding this manual and any changes the stakeholders deem necessary to make the IA program more effective.

Please contact:

Independent Assurance Program
Minnesota Department of Transportation
c/o Metro District Materials, Waters Edge
1500 W. County Road B2
Roseville, MN 55113-3174

200 Overview of the Independent Assurance Program

Independent Assurance is defined as “activities that are an unbiased and independent assessment of all sampling, testing, and equipment used in the acceptance program” (analogous to a 3-legged stool approach). IA is used industry wide as an internal audit and review to support the accuracy and integrity of the entire QC/QA acceptance program.

Independent Assurance Sampling & Testing (IAST) is a very important and integral part of the MnDOT Quality Assurance program. The IAST program is purposely separate from the normal QC/QA sampling and testing procedures. The IA assessment includes evaluation of procedures and equipment used for the acceptance of highway materials and construction.

The FHWA Code 23 CFR Part 637 requires each state to have an approved IA program in place. The IA program can be set up on a project (Which is the traditional approach), or a system basis. Some state have use a combination of both methods (“mixed approach”). The difference in the two standard approaches is the basis of the frequency of testing and either covers all projects (project) versus all personnel (system).

System-Based Example:

Material samples/testers are IA-reviewed on a system basis (one tester review and/or material sample/test per year covers many projects, using cross-referencing procedures). This system basis can best be described as a program that “tests all the testers” ensures that the laboratories, equipment, and testers providing test results are capable of performing tests and producing test results that are consistent with the standards set forth by the state. Typically states set a goal of reviewing 90% of the active testers per year. The challenge with this method is to try and determine who the active testers are for each year.

Project-Based Example:

Material samples/testers are IA-reviewed on a project basis (each materials sample/tester is unique to that project on a quantity or frequency basis). This ensures that key materials and/or testers are sampled / tested and the genuine IA results are presented to the Project Engineer in real-time on each project. This method works well if there are ongoing project issues that need to be investigated. However, this method is time consuming and limits IA staff availability for other projects.

MnDOT’s IA program utilizes a mixed approach that provides an opportunity to maximize the effectiveness and efficiency of the Statewide IA system (IAS) by incorporating the best elements of each program. MnDOT has determined the mixed approach to be the most flexible structure for utilizing Statewide IA staff, and it is also the most cost-effective method since it only requires reviews of the active testers.

The process to define or identify who is an active tester for each construction year begins at the District level. It also relies heavily on local knowledge of the IA staff to identify certified technicians who are currently working and testing out of each District’s Resident Construction

offices, County construction offices, City Engineering sections, Consultant Offices, and Contractor plant labs.

For the most part, the same technicians are testing year after year, so generally IA staff only has to identify the “new” technicians to make sure they are reviewed along with the regular testers. MnDOT’s Technical Certification Program (TCP) database currently has over 17,300 certified technicians Statewide; however, some of these technicians have changed careers, are not currently employed or are not testing in a given year, retired, moved, or deceased. The Project basis method does not require that every tester be reviewed, only the active testers for that year, and MnDOT’s IA program capitalizes on this benefit. QA at the project level is outlined in the MnDOT Contract Administration Manual and contract special provisions. The “Contract Administration Manual” sponsored by the TCP available at:

www.dot.state.mn.us/const/tools/docs/cam.pdf

Testing must be performed at prescribed frequencies, and records must be maintained in a manner consistent with approved standards. The most current Independent Assurance Schedule of Materials Control (IAST) is available at:

www.dot.state.mn.us/materials/labiaast.html

The MnDOT IA program recognizes the value of the AASHTO Accreditation program provided by AASHTO resource. MnDOT’s Central and primary District Labs participate in the AASHTO Accreditation program and are not subject to IA review. Experienced testers working in an AASHTO Accredited private lab may not require IA review. At the discretion of the District Materials Engineer or Specialty Unit, testers working in an AASHTO Accredited private lab may be reviewed. When tolerance or other issues are noted for an AASHTO Accredited private lab, the Maplewood Specialty Unit will be notified.

200.1 **History of the Independent Assurance Program**

In the early 1960s a Congressional investigation uncovered improper testing and fraud in some of the federally-funded highway projects on the old Federal-aid primary system. To address the issues of fraud and improper testing, a separate sampling and testing program was developed in the early 1990s. The program was operated by unbiased personnel not at all connected to the project and using different equipment than was used for project testing.

Samples were split with project personnel and test results were compared for tolerances. In addition, sampling and testing procedures were also observed to ensure proper protocol was followed and that equipment remained properly calibrated. In later CFR rewrites of the regulation, this program became the current IA program.

200.2 **Scope of Program**

The governing Federal Regulation 23 CFR 637 CONSTRUCTION INSPECTION and APPROVAL; Subpart B- Quality Assurance Procedures for Construction covers

only projects that are on the National Highway System (NHS). The regulation requires that testing personnel who perform any verification or quality control testing used in the acceptance decision be covered by a State IA program regardless of the agency administering a project, including a local agency or toll authority.

Some states (including Minnesota) have elected to extend IA oversight to all projects using State or Federal funds, including some local government aid highways. The extent of these IA duties is elaborated in Section 300 Roles & Responsibilities in this Manual. Additionally some states have IA testing staff perform other duties such as:

- instructing other testers
- obtaining samples for verification of manufactured products
- obtaining samples of aggregate, cement, binder samples at production facilities when issues arise
- inspecting precast or other facilities.

Even though these functions are a necessary part of the overall QA program, they will not be discussed in detail in this IA manual.

200.3 **Statewide IAIG**

In Minnesota, all IA District staff are organized into a Statewide IAIG that is comprised of the IA staff inspectors from MnDOT's Districts 1, 2, 3, 4, Metro, 6, 7, and 8. It is under the oversight of the State Pavement Engineer and under the authority of the State Materials Engineers Organization (MEO) group. The IAIG contains a liaison from the MEO (contains all District Material Engineers (DME)), OCIC, the State Pavement Engineer, a District Laboratory Chief Representative, and the FHWA.

The purpose of the IAIG is to ensure statewide compliance to the 23 CFR 637, attend annual meetings to resolve IA issues and construction matters that come up in the field, get the most current updates from specialty units, maintain uniformity in tester reviews and all IAST procedures throughout the state, develop recommendations, changes and enhancements to the IA program, and forward these to the MEO for discussion, approval and implementation. The following highlight the purpose and goals of the group:

- Assure compliance with policy, procedures, and guidelines set forth by the FHWA and MnDOT.
- Promote consistent and successful application of the IAST program.
- Monitor accountability of the group and its members.
- Provide a team effort in identifying and solving problems.
- Review competency of project testers in regard to procedures and proficiency.
- Effectively utilize group communications to exchange ideas and distribute information.

- Provide a professional and recognizable format to clients, customers and stakeholders.
- Encourage strengthening of relationships between the IAIG and other groups.
- Keep all members current with evolving technologies and test methods.
- Provide solid “organizational” expertise for MnDOT procedural policy changes.
- Encourage members to take reasonable risks to improve practices and procedures.
- Discuss current IA program and develop recommendations or enhancements if needed.
- Act as a resource for Specialty units, Consultants, Contractors, field personnel, and stakeholders.

200.4 **IA Officer Designations**

The officers shall consist of rotating IA Chair and Vice-Chair/Secretary with the positions being held for one calendar year. An officer assumes his/her duties on January 1st of the year with their duties ending on December 31st of the same year. The Vice-Chair moves into the role of IA Chair on January 1st the following year.

At the final close of the annual IA meeting in early December, the current/outgoing Chair will recognize the next year’s chair by ceremonially “passing the IA gavel” to the Vice-Chair. During the final 2-3 weeks of their terms, the current IA Chair will work closely with the Vice-Chair. Throughout this “transition period”, the current chair will be responsible for wrapping up all unfinished business from the current year, developing and passing on notes for carry-over action items, and ensuring that all duties of the Chair are completed by December 31st. The Vice-Chair will complete the last meeting notes and distribute to the IAIG and MEO by year’s end.

The rotation schedule provided in Section 200.5 will be used to determine who is on deck to serve as the next years’ Vice-Chair/Secretary.

200.5 **Officers Duties**

The following positions and committees have been established. Note however, that various committees can be formed as needed by IAIG and meeting minutes will be distributed to the IAIG and stakeholders.

- IA Chair
- Vice-Chair/Secretary
- “Independent Assurance Advisory Committee”
 - Consists of an IA chosen representative from north, central, and south parts of the state, MEO Liaison(s), Technical Certification liaison, State Pavement Engineer, FHWA, and any invited guests. This group meets as-needed to deal with important topics that come up during the season that cannot wait for the IA year end meeting.

- IA Database Committee

IA chosen representative from north, central, and south parts of the state-meets on an “as needed” basis to deal with ongoing database issues and problems.

The IA Chair’s responsibilities shall include:

1. Preside over each meeting.
2. Act as a tie-breaking vote if needed.
3. Develop meeting agendas (this may be accomplished by notes gathered from IA issues brought forth throughout the past season, Specialty Units, and any MEO concerns).
4. Present IA meeting draft agenda to MEO chair for approval by end of October or sooner.
5. Invite and schedule Specialty Unit speakers, liaisons, and guest speakers.
6. Investigate local accommodations availability, prices, and extras and pass findings onto IAIG
7. Schedule conference center dates, room, AV/computers, etc.
8. Represent the group if required as IA liaison, or appoint a stand in.
9. Follow-up on all “**action items**” from IA meetings.
10. Ensure that any necessary updates to IA Materials Control Schedule, IA Manual, or webpage are done.
11. Review progress of all committees and keep them “on task”
12. Call special meetings (video conference or in person) if needed.
13. Draft and finalize the year-end Statewide IA report to the FHWA and MnDOT.

The Vice-Chair/Secretary’s duties shall include:

1. Take IA meeting minutes and distribute completed minutes to IAIG by end of the year.
2. Fill in for the Chair in his/her absence and appoint a fill-in person to take notes if needed.
3. Work closely with the current IA Chair during 2-3 week transition period at the end of December.
4. Assume duties at the Chair at beginning of the year.
5. Any other duties assigned by Chair.

The following rotational IA Chair schedule has been developed:

| Year | Chair | Vice-Chair/Secretary |
|-------------|--------------|-----------------------------|
| 2016 | D-7 | D-8 |
| 2017 | D-8 | MW* |
| 2018 | MW | D-1 |
| 2019 | D-1 | D-2 |
| 2020 | D-2 | D-3 |
| 2021 | D-3 | D-4 |
| 2022 | D-4 | ME** |
| 2023 | ME | D-6 |
| 2024 | D-6 | D-7 |
| 2025 | D-7 | D-8 |
| 2026 | D-8 | MW |
| 2027 | MW | D-1 |
| 2028 | D-1 | D-2 |
| 2029 | D-2 | D-3 |
| 2030 | D-3 | D-4 |
| 2031 | D-4 | ME |
| 2032 | ME | D-6 |
| 2033 | D-6 | D-7 |
| 2034 | D-7 | D-8 |

* MW = Metro District West

** ME = Metro District East

200.6 **Independent Assurance Annual Meeting**

The annual IA meeting will be held the *first full week of December on either Tuesday/Wednesday or Wednesday/Thursday* at the Conference Center in St Cloud or another prior mutually agreed upon time and location with proper lead time.

The normal time frame is two half day meetings:

- Day 1 – Starts at 9:30 am (to allow for outstate drive times) and ends by 5:00 pm.
- Day 2 – Starts at 8:00 am and ends 12:30 pm (to allow for outstate drive times).

Normal meeting start or ending times can be adjusted each day by majority vote as business agenda warrants. If a large IA agenda has been created, addition of a third meeting day (3-day meeting) requires MEO approval.

Additional meetings may be called by the Chair on an “as needed” basis with approval of the MEO current Chair/president. This may be accomplished in person or

by using E-technology such as video conferencing or Microsoft Skype for Business (formerly Lync).

300 IA Program Objectives: Roles and Responsibilities

300.1 IA Individual Components

The objective of the MnDOT's IA program is to provide a mechanism for formally recognizing the competency of testing personnel to perform specific tests on construction materials. It is available to federally funded State Aid projects, Contractors, Consultants, and local agencies. Participation in the QC/QA program is **required** for all testers (both MnDOT and Contractor) who provide test results for contract acceptance or payment considerations on NHS projects. MnDOT management has elected to extend the guidelines on all State Trunk Highways and local State or federally funded State Aid county and municipal highway projects.

The IA program consists of seven individual components, which are described in detail in Section 400:

1. IA staff qualifications.
2. QC/QA tester certification / laboratory accreditations
3. Certified tester training
4. Test equipment calibration
5. Project Documentation and Reporting / Annual FHWA reporting
6. Laboratory/field tolerance investigation process
7. Tolerance: Disagreement Resolution Process – (third party), suspension, revocation, appeals

By using the Technical Certification Program (TCP) and IAST combined project-system approach process for reviewing testers, equipment, and results, the IA program allows a tester's qualifications to be ascertained by written examinations, observation of test methods, and passing test results on proficiency samples of materials. Centrally designated State Department of Transportation (SDT) AASHTO laboratories and/or staff are reviewed by IA personnel only upon request by the Maplewood Specialty Unit or DME to investigate tolerance issues.

This combined approach allows flexibility to sample and test key project-specific materials if needed. MnDOT's approach follows the current IAST SMC that states, at a **minimum**, 1 sample per project per year and reviews each tester once per year for each type of test. *IA staff always reserves the option for additional or multiple reviews and samples if needed.*

300.2 Regulations

The FHWA's QA requirement is described in Title 23, CFR, Chapter I, Part 637 (23 CFR 637). The CFR generally states that each STD shall develop a QA

program that will ensure the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS are in conformity with the requirements of MnDOT's plans and specifications. "Quality Assurance Procedures for Construction" are outlined in 23 CFR 637, Subpart B, and it is stated that, STDs, such as MnDOT, are responsible for developing, maintaining, and administering a quality assurance program that includes an approved IA program.

The FHWA requires that:

- Testing equipment be evaluated by using calibration checks and/or proficiency samples.
- Testing personnel are fully certified and that they are evaluated by IA observation review with IAST proficiency and/or project samples submitted to a designated STD laboratory a minimum of at least once per year.
- Proficiency test results are evaluated and guidelines are developed, including tolerance limits, for the comparison of test results.
- STD's report **annually** to the FHWA summarizing the efforts of the IA program.

To view the current version of 23 CFR Part 637, Subpart B - Quality Assurance Procedures for Construction see Section 600.4

300.3 **Roles and Responsibilities**

This section describes individual roles and responsibilities for the implementation of MnDOT's IA program. Each sector described in this section is uniquely important but reliant on each other. Also each division has specific, defined duties to follow for the overall Acceptance program to be effective and successful.

General details of the procedures to be followed by each sector are further described in this section. The **responsibilities listed in this IA Manual are not a comprehensive list of duties for each sector but a broad overview from the IA perspective**. Please consult individual Specialty Unit Manuals for details.

300.4 **Headquarters Roles and Responsibilities**

The "*Office of Construction & Innovative Contracting*" is responsible for setting statewide policies or processes that address contract administration issues.

- Provide reviews to document the understanding and application of processes for administering contracts.
- Develop training for new policies/processes.
- Provide expert assistance on complex and sensitive contract administration issues.

- The “*State Pavement Engineer*” (based at the OM&RR) is responsible for direct oversight, plus statewide administration and implementation of the IA program, and annual reports to the FHWA summarizing the efforts of the IA program.
- The MEO group is responsible for the direction of, and has authority over the State IA program. In turn, each DME is responsible for the oversight of their District IA (DIA) staff.

300.5 **OCIC and TCP Staff Responsibilities**

The OCIC is responsible for directing and managing the TCP. This office is located and run out of the Central Office in St. Paul and supports but is not part of the IAST program.

OCIC (TCP) staff:

- a. Manage the Technical Certification Unit.
- b. Develop guidelines and administer tests for technical certification of personnel.
- c. Assign certification numbers, issue full 5 year certification cards, print out and send yearly.
- d. Develop class training schedules and reserve testing rooms and laboratory space.
- e. Manage and maintain the statewide Technical Certification database of testing personnel and download updated data into the IA database quarterly or as needed.
- f. Develop, update, maintain, and administer statewide written examinations for uniformity.
- g. Approve practical (hands-on) review procedures required for some certifications and reviews credentials of written and hands-on instructors.
- h. Has final authority on tester certification suspensions, decertification, and revocation.
- i. Work with DIA staff for teaching “hands-on” portion of certifications and scheduling retest proctors.
- j. Work with DIA staff in disagreement resolution process involving certification of testers and equipment.

300.6 **District Responsibilities**

Administration of the IA program in each District is the direct responsibility of the DME, a Principal Engineer, or in some instances an Administrative Engineer (AE).

300.7 **District IA Staff Responsibilities**

DIA staff will maintain all current certifications by participating in the TCP's full 5 year Technical Certification testing program. This includes attending the refresher courses offered by the Specialty Units each year on a rotational basis or any other training deemed necessary by their Supervisor. DIA staff will also be subject to random proficiency test(s) and reviews by their Supervisor or by recommendation of the Specialty Unit if needed.

All IAST reviews are testing *minimums*, governed by the most current year IAST SMC. IA staff reserve the right to review, re-test, and re-sample as many times as they feel necessary to ensure project personnel and equipment are in full compliance with the MnDOT Acceptance program.

* **Note:** In some instances IA reviews are done for a project-specific materials reason to get an IAST sample for the laboratory and is not done for purposes of re-checking a tester who successfully passed an earlier review.

DIA staff is **required to:**

- a. Maintain at least current minimum Level #1 required Technical Certifications as indicated in Section 400.2 of this manual.
- b. Implement and administer the MnDOT IA program at a District level.
- c. Gather District project plans & proposals, review for IA participation and IA quantities per IAST SMC, set up project in IA database and files, send out IA lead letter and requirements to Project Engineer and / or stakeholders.
- d. Qualify (review), requalify (re-review) IAST observations and submit IAST samples as needed.
- e. Recommend suspensions or disqualifications of MnDOT, local agency, consultant, and private sector testers based on IAST review findings.
- f. Verify the calibration status of all equipment used for testing on NHS projects, MnDOT projects, and local State aid projects. Verify that approved calibration methods are used on MnDOT projects and ensure equipment is correctly tagged. Oversee tracking process of all project test equipment, excluding the STD central AASHTO laboratories.
- g. Prepare, submit split samples to MnDOT STD laboratory, evaluate results from split samples, and review laboratory/field tolerance.
- h. Perform timely follow ups on all laboratory/field tolerance problems, issue reports to the Project Engineer.
- i. Review plant contact reports and perform yearly plant certification reviews *if required*.
- j. Initiate the **IA lab/field tolerance investigation process** if triggered by out of tolerance test results as needed.
- k. Review / witness *all tests* as the test is actually being performed in the field or laboratory per IAST SMC.
- l. Perform bituminous tester plant Level #1 performance evaluations as needed.

- m. Conduct annual QA plant inspector/monitor reviews of agency and consultant personnel.
- n. Maintain detailed IA diary, document all IA activities and field/project anomalies including report as listed in each component of the hands-on **IAST Job Field Guide**, or other tasks as assigned by DME. Enter comments into IA database section.
- o. Maintain secure locations for confidential IA records and materials.
- p. Submit timely IA action contact reports to project personnel as required, and provide year end IA project summary reports to Project Engineers and FHWA activity reports by January 31st.
- q. Assist the TCP with teaching hands-on segments of the classes. Also proctor retests and test-outs as needed.
- r. Provisionally certify new testers during construction season or as needed. Provisional certifications **will not be issued** to testers who failed/cannot pass the regular TCP 5-year certification classes; these individuals will need to retake and pass the full class in the next training season.
- s. Provide technical advice/assistance to all project personnel, other agencies or consultants if needed.
- t. Regularly (Bi-weekly) update IAS database with tester reviews entered in “IA action details” and “tests” tab, and any comments from IA diary.
- u. Enter IAST materials field and laboratory test results and comments into IAS database tabs “materials samples” and “test results”.
- v. Review all “*Materials Certification Exception Summaries*” for IAST accuracy and completeness, check and initial correct IA box, obtain DME signature, and return to sender.
- w. Submit yearly IA reports to MnDOT Specialty Units on material related issues as needed.
- x. If an infraction from Section 400.6 is discovered, IA must notify Statewide IAs to track possible movement of tester and notify TCP unit if need be.
- y. Report annually (by end of January) to the State Pavement Engineer, detailing District results of IA activities for the past year for FHWA compliance to the CFR:
 - Total number projects reviewed, number of county/city/state or federal aid projects reviewed, total tester reviews, total tester failures, total IAST samples taken, projects missed, total reviews missed, and total samples missed.
 - Outcome of cases: equipment not calibrated, samples out of tolerance, incorrect procedures.
 - A general statement prepared by the IAIG President following the annual meeting that recaps any major issues or concerns in regard to construction and materials.

300.8 District Construction (Resident Office) Responsibilities

District Construction (Resident Offices) manages all construction projects and contracts in accordance with statutory requirements, MnDOT directives, and OCIC policies. District Construction is responsible for implementing and administering the QA program outlined in the [Contract Administration Manual](#).

300.9 District Materials Engineer Responsibilities

The *DME*:

- a. Reviews and signs project “*Materials Certification Exceptions Summary*” form certifying they have had the ***opportunity for review & provide input on the project***. MnDOT has elected to use this process on both NHS and Non-NHS projects, as well as State Aid projects using State or Federal funding.
- b. Reviews all test results of acceptance samples that indicate material was incorporated in the construction work controlled by sampling and testing are in conformity with the governing SMC and the approved plans and specifications.
- c. Reviews and gives consent on change orders governing materials or compaction changes.
- d. Ensures that any and all Materials Exceptions are listed on the summary and resolved correctly.
- e. Ensures that any or all monetary price adjustments, project changes, or supplemental agreements have been applied and documented.
- f. Works with project personnel to resolve any materials issues or design problems.
- g. Oversees all DIA staff or assigns another supervisor to do so.

300.10 Project Engineer Responsibilities

The *Project Engineer*: (per [Contract Administration Manual “Project Authority” 5-591.200](#) and [Standard Specification 1501 “Authority of Engineer”](#))

- a. Ensures that no tests or samples are taken on a MnDOT project unless the tester is certified in the test being performed.
- b. Responsible to ensure that **DIA is notified at the start of the project** and that IA is subsequently called in a *timely manner* to perform IA reviews **on all project testers** before substantial material testing is done on the project.
- c. Notifies DIA staff of any problems regarding materials, competency of testers, new staff testers, new or damaged equipment, and calibration difficulties.
- d. Ensures that materials and completed work comply with plans, specifications, and design criteria.
- e. Prepares the “[Materials Certification Exceptions Summary](#)” form (packet) that certifies results of tests on acceptance samples that indicate the material incorporated into the construction work controlled by sampling and testing are not in conformity with the approved plans

and specifications. Any material exceptions and/or non-conforming material incorporated into the project are listed and have a proper resolution. Any Contract change orders that were prepared to accept the material need to be included with the Exception Summary to properly process and accept the materials.

- f. Decides on quality and acceptability of materials furnished and work performed.
- g. Has the authority to make adjustments to plans if needed.
- h. Has the authority to suspend work and adjust working days.
- i. Decides on manner of performance and rate of progress of work.
- j. Has the final authority in the interpretation of the plans, specifications, special provisions, change orders, and force accounts.
- k. Determines final measurements, control of quantities, and the amount of any monetary price adjustments or modifications to be made with payments vouchers.

300.11 The Project Inspector/Tester Responsibilities

The *Project Inspector/Tester*: (In accordance with [Standard Specification “Authority & duties of the Inspector” 1510](#))

- a. Maintains current MnDOT certifications needed to test.
- b. **Performs acceptance tests only for which he/she is currently certified to perform.** See the [“Technical Certification Handbook”](#) for certifications needed to perform specific tests.
- c. Prepares clear and accurate test results and diary entries.
- d. Notifies the Project Engineer immediately of any failing material test results or non-conforming work.
- e. Ensures that equipment is functioning correctly, is properly calibrated, and has a valid calibration decal attached.
- f. Cleans and maintains test equipment to ensure that it is kept in an operable condition and calibrated annually.
- g. Must **notify DIA staff with at least a 24-hour notice** so IA staff can complete the required annual IAST review(s) during testing on a project but should be set up as soon as practical once the tester starts testing on the project for the year. Proactive scheduling will assure the Project Engineer that the tester is fully competent while also allowing time to correct any improper procedures before they become habitual.
- h. Is authorized to inspect the work and preparation, fabrication, or manufacture of materials as the Project Engineer’s representative.
- i. Measures final quantity of work.
- j. In the absence of the Project Engineer, the Field Inspector/Tester acts as the Project Engineer’s direct representative and has Contract authority to reject/suspend non-conforming work under Standard Specifications 1511 and 1512.

300.12 **Local Agency Responsibilities**

Local Agencies: For IAST program standards on local agency construction projects refer to the [State Aid for Local Transportation \(SALT\) Manual](#) for additional information. The Minnesota State Aid Office has elected to follow the QC/QA/IA program and current MnDOT SMC on projects on the NHS, projects in or on State ROW, or projects which are state-or-federally-funded. Joint local agency / MnDOT projects (cooperative agreements) shall also follow MnDOT QC/QA/IA procedures as listed above and will follow this Manual. All Federal/State funded projects usually will have a project identifier number in the very upper right hand corner of the plan sheet front cover [i.e. Minn. Proj. No. HSIP 8215 (083)].

On local system roads using local or municipal funds, the project will generally follow the current [SALT SMC](#) but may also follow [MnDOT's SMC](#). Generally, this type of project will begin the identifier with the letters S.A.P.

If a SALT project meets the above criteria, the local agency, or contract administration Consultant working on their behalf, must consult with DIA staff and work closely with the IA from the beginning to ensure all SMC items and required IAST samples and reviews are completed. The local agency or their Consultant must also notify IA staff ahead of time to schedule reviews and communicate when specific work is being done and what materials requiring IA reviews are used*. Upon completion of the project, the local Engineer or Consultant will compile all reports for the Exception Summary packet and work with IA staff to get all exceptions resolved correctly.

*Contact the local District State Aid Office or visit District's SALT website for specific District guidelines and policies.

400 Program Individual Components

400.1 IA Individual Components

The IA program consists of seven major individual program components:

1. IA staff certification
2. QC/QA tester certification/ lab accreditations
3. Certified tester training
4. Test equipment calibration
5. Project Documentation and Reporting : Annual FHWA reporting
6. Lab/field materials out-of- tolerance investigation process.
7. Lab/field tolerance / Disagreement resolution process – (third party) suspension, revocation, appeals

400.2 IA Staff Certification Requirements

All MnDOT DIA staff are required to carry non-provisional MnDOT Technical Certifications, and at a minimum maintain valid Level #1 certifications at all times. Once certified, DIA staff must maintain all required certifications by attending and passing recertification courses offered by the Technical Certification Unit. At time of hire, minimum qualifications for all IA staff are to have at least 2 years active construction, field, plant and/or materials laboratory experience in each certification area.

IA staff must possess a valid driver's license.

If at any time a member of the IA staff loses a minimum Level #1 certification or driver's license, they must immediately report this to their Supervisor and will be suspended from performing IA review duties until the situation is resolved and license and/or certifications are procured. Minimum Level #1 required Technical Certifications are:

- Aggregate Production
- Bituminous Street
- Bituminous Plant #1
- Concrete Field #1 or ACI [Concrete Field Testing Technician - Grade I](#)
- Concrete Plant #1
- Grading & Base #1

Due to a high expertise and level of understanding, Level #2 field certifications are *desired* for all IAI's. Obtaining Level #2 certifications will benefit a new hire's chance for the IA position, while current IA staff can gain and use Level #2 certifications for professional development goals and future IA promotional opportunities.

400.3 IA Staff Certification Procedures

In addition to the certification requirements in Section 400.2, IA staff will complete, pass, and maintain any new Technical Certifications that the MEO or Specialty Units may deem necessary due to future specification and testing changes. Examples include paving, concrete strength testing training, beam breaking, Lightweight Deflectometer (LWD), nuclear gauge, among others. Also IA staff will attend all plant monitor refresher courses that the Specialty Units hold every other year. IA staff will also be subject to random proficiency test(s) and reviews by their Supervisor or by recommendation of the Specialty Unit if needed.

To avoid conflict of interest issues, IA staff will not perform tests other than IA testing while assigned IA responsibilities. **Under no circumstances will testing performed by IA staff be used as acceptance program testing or to verify specification compliance and/or inspections on construction projects.** IA staff will not act as QC/QA coordinators nor will they perform testing used in project acceptance.

It is the IA staff's responsibility to review and qualify testers on testing methods as needed; MnDOT, AASHTO, and American Society for Testing and Materials (ASTM) test methods are available on the applicable websites. Construction staff will assist DIA staff by becoming familiar with test methods, be responsible for *training all field testing personnel*, and reviewing current updates on new methods and tech memos.

400.4 QC/QA Tester Certification Overview

At the project level, MnDOT's QA process requires that only **certified** testers and AASHTO accredited laboratories provide test results on which acceptance decisions are based.

A QC/QA tester's thorough knowledge includes:

- Importance and responsibilities of proper sampling and testing.
- Current MnDOT test procedures and specifications.
- Test methods, calculations, and related paperwork and current forms.
- Safety guidelines used in the test methods, work zones, and plants.
- Maintenance/operation/calibration of the equipment used in the test procedures.

It is the responsibility of ALL testers to contact their DIA staff to initiate/fulfill their required yearly IA test review(s) if working on qualifying NHS projects. See Appendix A for the current list of MnDOT DIA staff. A list of current DIA staff is also available at:

www.dot.state.mn.us/materials/PDF/iaig-phone-list.pdf

400.5 Certified Tester Qualification Procedures

For a tester to become *fully certified* in a particular test method, they must be certified in the given field for that particular test (i.e. Aggregate Production, Bituminous Street, Grading & Base, Concrete Plant, Bituminous Plant, and Concrete Field). Full Certification is administered through the MnDOT TCP and is valid for five (5) years and expires on May 31st of the date that appears after each certification.

For Bituminous Plant #1 certification, upon successful completion of the written test, it is the **tester's responsibility to schedule the bituminous plant performance evaluation with the DIA staff** or the MnDOT District laboratory prior to the conclusion of the 12 month time frame.

In lieu of MnDOT Concrete field 1 a tester may be ACI [Concrete Field Testing Technician - Grade I](#) certified. Expiration dates for ACI certification will be different from MnDOT certification expiration dates. It is the responsibility of the individual to be aware of their certification expiration dates.

For further information, see the TCP handbook:

www.dot.state.mn.us/const/tcp/about.html

Maintaining MnDOT Certifications:

The *tester* is responsible for maintaining their certifications and scheduling re-certifications every five (5) years through the TCP. If a tester fails an exam and/or loses a certification, it is up to the tester to contact the TCP to reschedule a test or retake the class next season.

All certifications expire on May 31st of the fifth (5th) year; the TCP will issue a new certification card annually. Certifications with dates listed in **RED** will expire the following year on May 31st.

Provisional certifications will not be issued for testers who have failed exams or let their certifications expire.

All current certification or provisional certification cards issued must be on the tester's physical person to perform testing on MnDOT projects and be made available for examination by IA staff upon request. At plants, current copies of all testers' cards may be placed in a visible area on the laboratory wall. The copies must be updated regularly to reflect any personnel changes.

400.6 Additional IA Re-Review and Recommendation for Suspension

DIA staff **always** has the authority to perform additional IAST reviews *beyond the required minimums*, require an IA re-review to be done, or to *recommend* to MnDOT Audit unit suspension for testers who continually deviate from acceptable

sampling and testing procedures. DIA staff has justification for additional reviews or an IA re-review of a tester for any of the following violations:

- Using incorrect, broken, worn, or unreadable test equipment.
- Using equipment with a missing, invalid, or unreadable calibration decal.
- Incorrect sampling and/or testing procedures.
- General or habitual incompetence of tester.
- Refusal by tester to follow proper test procedures.
- Not having current certification card on person while testing.
- Failure to correctly perform required calculations.
- Failure to correctly complete required testing paperwork.
- Other reasons as requested and approved by the TCP or DME.
- Evidence of submission of fraudulent test results.

Testers can be re-reviewed by IA staff for any of the issues above. In addition, supplementary training of the tester by certified project personnel may be needed or required before scheduling an IA re-review. During this interim period, the tester receiving supplementary training should not be performing any QC or QA verification testing without a certified tester (MnDOT or American Concrete Institute [ACI]) present during all testing until reviewed by IA staff and successfully passing the review.

The Project Engineer is responsible to ensure the tester receives supplemental training and that they do not perform any testing on projects until they have passed the IA review. Any tester failing subsequent IA reviews may be recommended for suspension from testing on MnDOT and SALT projects for up to six months by the DME and/or recommended to the TCP Audit Unit for de-certification for habitual failures or refusal to follow correct testing procedures.

Once an infraction has been detected, the DIA staff will issue a report of tester issues and/or a letter to recommend disqualification or suspension to the Project Engineer, DME, and the TCP Office for further action. **MnDOT will not accept test results obtained by a suspended or de-certified tester during that period.**

In the case of evidence of submission of fraudulent test results, the tester's qualifications may be revoked and they may be de-certified for no less than one year upon review by the Technical Certification Advisory Board and TCP Audit Unit. A report will be sent to the Project Engineer/DME, District laboratory, and Technical Certification Unit.

An individual may appeal the process and reapply for certification after the period of revocation expires. See the “Revocation of Certification” Section in the current [Technical Certification Handbook](#) for exact details of this process.

400.7 **Laboratory Accreditation**

All IAST samples will be tested at a designated central district MnDOT laboratory (STD). Samples will be tested by certified, AASHTO accredited lab personnel or IA staff.

In order to protect the integrity of the IA program and avoid any conflicts of interest or even the perception of a conflict of interest, Project QC or QA verification samples cannot be tested at the same laboratory and must be tested on different equipment in different laboratory and personnel. If a certified Consultant AASHTO accredited laboratory has been hired to perform testing on project QA verification samples, the laboratory must comply with the requirements for accreditation.

400.8 **Calibration of Test Equipment Requirements**

All field or laboratory equipment used in materials testing for projects on the NHS must be calibrated and tagged as part of the QC/QA acceptance program. As part of this calibration review process, IA staff is charged with oversight of tracking and documentation of all test equipment calibrations.

All materials testing equipment for field and/or laboratory use shall be properly calibrated, visually inspected, examined, and tagged prior to use and thereafter **annually** unless otherwise noted by the associated test method requiring a more frequent calibration interval. Guidance for equipment calibration is available from the following sources:

- The manufacturer’s recommendations.
- AASHTO test methods.
- ASTM test methods.

400.9 **Calibration of Test Equipment Procedures**

Calibration

Each District Construction Resident office is responsible to ensure calibration and inspection of all test equipment used on their projects. Other Local Agencies are responsible for calibration of their own equipment, or making other arrangements for certified personnel to do the calibration.

Laboratory managers are responsible for calibration of all equipment associated

with test methods for their particular laboratories. In Contractor, Consultant, or Field Office laboratories, calibration records of all equipment will be kept on site and be made available to IA or the Project Engineer upon request.

District Construction or other Agencies may hire out the calibration of test equipment to qualified agencies or consultants provided calibration records of all equipment are kept on site and be made available to IA review upon request. IA staff may require a re-calibration or inspection if the test equipment is damaged or suspected of giving erroneous test results.

All test equipment shall be uniquely identified with an equipment tracking number. This number should be on a permanent sticker or etched into the testing apparatus in a visible area.

The calibration data which includes unique equipment numbers, calibration date, and name of person performed the calibration, visual inspection, and/or examination shall be kept in the same laboratory or field office where the test equipment is used. It may be stored electronically or in hard copy.

Equipment Calibration Decals:

When a piece of equipment is properly calibrated or inspected, a calibration decal will be firmly affixed to the equipment indicating:

- Equipment unique identification number.
- Calibration date.
- Name or full initials of the calibrator or inspector.
- The next calibration date (if applicable).

Calibration decals may be from a manufacturer or agency/consultant provided they are durable, firmly affixed to the uniquely identified equipment, and contain the information listed above. If calibration decals become lost or unreadable the equipment will be removed from service until it is recalibrated and a new calibration decal is affixed.

Maintenance

All testing equipment shall be maintained in accordance with manufacturers' recommendations, industry standards, test methods, and State policies. Maintenance recommendations may be found in the manufacturer's operator's manual or its website.

After initial calibration or inspection, testing equipment will be recalibrated annually (or more frequently as indicated by the associated test method) by trained staff. If any equipment is broken or out of calibration, the equipment will not be used until it has been repaired and recalibrated.

When a permanently installed piece of test equipment is relocated or major

repairs are performed, recalibration is required prior to use on NHS projects.

Equipment that cannot be properly calibrated, inspected, or uniquely identified shall not be used.

400.10 **Plant Certification (Contact Reports)**

Another task of DIA staff as part of the QC/QA certified plant program is to complete material production “Contact Reports” from all contractor plants that produce material for qualifying (NHS) projects. This material may also be used on State Trunk Highways and local State or federally funded State Aid county and municipal highway projects. Production plants will include both bituminous and concrete production, as well as stationary and portable plants. This report is typically done at the beginning of the season before production begins, but may be done moreover as needed or requested during the year.

As an alternative to IA staff completing the reports, the plant certification contact reports may be done by other *certified* MnDOT Construction personnel as directed by the DME. If this method is chosen, the DIA staff must have oversight of the process and all plant certification documents are to be made readily available for IA review upon request.

400.11 **Initial Project Documentation**

A key function of the IAST program is to review all incoming plans and proposals from MnDOT, State Aid, Locals, and Consultants. A determination if the project meets IA participation requirement is made by:

- Reviewing funding sources and IA records.
- Project location in the NHS system.
- Project plan quantities and compaction requirements.
- Reviewing most current IAST SMC.

The IA staff enters the project details into the IA database and creates project requirements, reports, lead letter, and a project hard copy file. The final step is for IA to send a contact packet to the Project Engineer that contains the lead letter, requirements, and IA staff overseeing the project.

400.12 **Project Documentation During Construction**

While under construction, the IA will perform reviews on testers and equipment and take detailed field notes on the entire testing procedure. They will also make copies of all paperwork and test results from the IA review(s). The information gleaned from all these sources will be compiled and entered into the IAST database. This web-based record of tracking Statewide IA activities creates

comprehensive activity reports for:

- Individual contact report of review summaries of IA tester reviews, including comments on equipment and materials testing data.
- Project Summary reports of all testers & materials used on the project.
- Project Lead Letters (sent to Project Engineers).
- Initial contact IA project requirement reports.
- Action Inventory reports that are assigned unique ID numbers and can be searched for cross-references, pass/failed IA reviews, and provisional certifications.
- Final FHWA Year-end District count report.

These reports are created throughout the IA review process, and at different intervals, are sent to the Project Engineer, DME, IA file, and other stakeholders as needed.

If an IA review finds a tester, equipment, or laboratory/field tolerance issue, it will be brought to the immediate attention of the Project Engineer to determine the final resolution.

400.13 **Project Finals Reports on IA-related Portions of the Project:**

When the project is complete and ready to be finalized out for payment, the Project Engineer will follow the requirements of the [Contract Administration Manual](#). The *Materials Certification Exception Summary* information will be sent to the District Materials Unit for IA review and DME signature.

This *Materials Certification Exception* packet should contain the following IA-specific items:

- A completed *Materials Certification Exception Summary* ([Form TP-02171-04](#))
- A completed project tester/sampler roster, listing only the active testers who performed physical tests on the project. Multi-year projects will require an updated roster for each year.
- A Bituminous Plant exceptions recap report detailing any materials exceptions noted during production. This should be submitted by the person, Agency, or Consultant hired to perform the plant QC/QA monitoring.
- A Concrete Plant exceptions recap report detailing any materials exceptions noted during production. This should be submitted by the person, Agency, or Consultant hired to perform the plant QC/QA monitoring.
- Copies of change orders, supplemental agreements, or back sheet items.
- Any reports from Specialty Units or Materials laboratory listing failures

or recommended monetary price adjustments.

IA staff will review all *Materials Certification Exception Summary* packets for accuracy, completeness, and discrepancies against the IA database and hard copy files. Additionally they will review the supplied roster of testers against the Technical Certification database and compare field results of the field review IAST sample against the SDT laboratory report to check for tolerance issues. Any discrepancies will be returned to the Project Engineer and resolved before signatures.

If the packet is complete and IA requirements fulfilled, IA staff will sign and date the appropriate IA box on the lower left hand corner of the Summary and pass on to the DME for review and signature. The packet is returned back to the Project Engineer or the appropriate sender.

At the end of the year IA staff will query the IA database on every project and generate a final year end Summary Report account of DIA activities on all projects. IA staff sends this final year end Project Summary Report to all of the Project Engineers.

400.14 **Annual Reporting to FHWA**

At the end of each year, each DIA staff is responsible for creating a final IA year-end District number count report using the IA database by answering the eight questions required by the FHWA. This is done to demonstrate MnDOT's compliance with the 23 CFR 637 requirements.

Once all IA reviews, reports, and samples have been entered into the IA database at the end of every calendar year, IA staff query the IA database to generate a final year end account of DIA activities. IA staff sends this final Project Summary report to the State Pavement Engineer.

This process consists of:

- Creating a District report answering the current 8 FWHA required questions on Statewide IA activities by using the IA database to compile the results:
 1. Number of MnDOT projects reviewed
 2. Number of County, City, Federal Aid projects reviewed
 3. Number of tester/monitors reviewed
 4. Number of tester/monitor failures
 5. Number of IAST samples taken
 6. Number of Project missed
 7. Number of tester/monitor reviews missed
 8. Number of samples missed

- By January 31st of the following year, each DIA staff will send copies of the District year-end report to the following individuals:
 - State Pavement Engineer
The State Pavement Engineer will create a statewide report and send to the FHWA Minnesota Division Pavements and Materials Engineer.
 - DME
 - STD-IA file.

500 Laboratory/Field Tolerance Investigation / Disagreement Resolution

500.1 Lab/Field Tolerance Investigation & Resolution Process Overview

The IA laboratory/field tolerance resolution process is a uniform procedure of progressive step investigations used by Statewide IA staff when an IAST materials sample taken during an IA review is out of the laboratory/field test tolerance accepted range(s). The investigation process is initiated when the results from an IA split sample are out of the accepted tolerance range bands as listed in [Procedure 1003 of the MnDOT Laboratory Manual](#).

As soon as the MnDOT District lab IAST split sample report is received into the IA office, IA staff will review the data and compare the results against the IAST field or plant test companion results. If the results fall outside the acceptable range provided in the tables in MnDOT Laboratory Manual Procedure 1003, the tolerance investigation process will be initiated as soon as possible to identify the root cause of the problem and develop a solution.

500.2 Laboratory/Field Allowable Differences (Tolerances)

The following Tables are provided for reference only and the current versions should be verified in the MnDOT Laboratory Manual.

Table 1003A: Bituminous Aggregates Allowable Differences (Tolerances) Between Lab & Field Results and within Lab Results

| | Column 1 | Column 2 | Column 3 |
|--|---|--|------------------------------------|
| Bituminous (AFT) Gradation Sieve % passing Sieves <i>(Specification Sieves Only)</i> | 1st Lab Test & Field Test | 1st and 2nd Lab Test (Single operator tolerance) | 3rd Lab test & 1st or 2nd Lab Test |
| 50 - 9.5 mm [2 inch to 3/8 inch] | 6% | 4% | 2% |
| 4.75 mm [#4] | 5% | 3% | 2% |
| 2.36 mm - 600µm [#8 - #30] | 4% | 3% | 1% |
| 300µm [#50] | 3% | 2% | 1% |
| 150µm[#100] | 2% | 1% | 1% |
| 75µm [#200] | 1.2% | 0.8% | 0.4% |
| Bituminous (Non-AFT) Gradation Sieve % passing Sieves | | | |
| 25.0, 19.0, 12.5, 9.5 mm [1", 3/4", 1/2", 3/8"] | 6% | 4% | 2% |
| 4.75 mm [#4] | 5% | 3% | 2% |
| 2.36 mm [#8] | 4% | 3% | 1% |
| 0.075 mm [#200] | 2.0% | 1.3% | 0.6% |
| Bituminous | | | |
| Mixture Bulk Specific Gravity (G_{mb}) ** | 0.030 | 0.020 | 0.010 |
| Mixture Maximum Specific Gravity (G_{mm}) | 0.019 | 0.011 | 0.006 |
| Fine Aggregate Angularity, Uncompacted voids (U) % | 1% | 0.5% | 0.3% |
| Coarse Aggregate Angularity, % fractured faces (%P) | 15% | 10% | 5% |
| Aggregate Individual Bulk Specific Gravity both (+4.75mm [+ #4]) or (-4.75mm [- #4]) | 0.040 | 0.027 | 0.013 |
| Tensile Strength Ratio (TSR) %, Traffic | No Lab Field Tolerance, see Bituminous Specifications | | |
| Bituminous Asphalt Binder Content | | | |
| Chemical Extraction Methods, % | 0.4 | 0.3 | 0.1 |
| Incinerator Oven, % | 0.3 | 0.2 | 0.1 |

** Of the average of three pucks for Marshall or of the average of two pucks for Gyratory.

Table 1003B: Concrete Allowable Differences (Tolerances) Between Lab & Field Results and Within Lab Results

| | Column 1 | Column 2 | Column 3 |
|--|---------------------------|--|------------------------------------|
| Concrete Gradation Sieve % passing Sieves <i>(Specification Sieves Only)</i> | 1st Lab Test & Field Test | 1st and 2nd Lab Test (Single operator tolerance) | 3rd Lab test & 1st or 2nd Lab Test |
| 50 - 9.5 mm [2 inch to 3/8"] | 6% | 4% | 2% |
| 4.75 mm - 425µm [#4 - #40] | 4% | 3% | 1% |
| 300µm [#50] | 3% | 2% | 1% |
| 150µm[#100] | 2% | 1% | 1% |
| 75µm [#200] | 0.6% | 0.4% | 0.2% |

Table 1003C: Grading and Base Allowable Differences (Tolerances) Between Lab & Field Results and Within Lab Results

| | Column 1 | Column 2 | Column 3 |
|--|------------------------------|--|--|
| Grading and Base Gradation Sieve % passing Sieves | 1st Lab Test & Field Test | 1st and 2nd Lab Test (Single operator tolerance) | 3rd Lab test & 1st or 2nd Lab Test |
| 75, 50, 25, 19, & 9.5 mm [3 inch, 2 inch, 1 inch, 3/4", & 3/8"] | 6% | 4% | 2% |
| 4.75 mm, 2.00mm, & 425µm [#4, #10, & #40] | 5% | 3% | 2% |
| 75µm [#200] | 2.0% | 1.3% | 0.7% |
| Moisture Density Relationship (Proctor) | | | |
| Density | 3 lbs/ft ³ | | |
| Target Moisture | 2% | | |

Other tables in MnDOT Standard Specifications, such as Table 2360-9 or Table 2461-28, provide allowable tolerances that may be applicable for IA staff.

500.3 IA Procedures for Laboratory/Field Tolerance Investigation Process

Upon receipt of the SDT laboratory test results from the IAST sample, IA staff will review each report before placing it into the IA project files. **IF** a laboratory/field “out-of-tolerance” has occurred, at the discretion of the IA, an investigation process *may* be initiated. The tolerance investigation includes the following steps:

1. IA staff will require a re-test of the technician and materials sample in question as soon as possible. Special attention should be paid to the materials sampling and splitting process since a majority of tolerance issues can be traced back to improper sampling and splitting. All test procedures and paperwork should be closely monitored for conformity, and all test equipment used should be physically inspected for damage, wear, current calibration decal, and be in proper working condition. Another split sample should be submitted to District SDT laboratory for testing.
 - During the IA investigation, if faulty test equipment or an “out of calibration” condition is found, suspect test equipment must be immediately taken out of service, replaced, or recalibrated prior to subsequent QC or QA verification testing. A record of recalibration or removal from service will be sent to IA staff to document that the issue has been resolved, even if other equipment was used to complete the investigation.
 - In addition, if the technician is using improper procedures, the technician will need to be re-trained by certified project personnel. The technician will not be permitted to perform any QC or QA verification sample testing without direct observation by a certified technician until an IA re-review is completed satisfactorily.
 - **If the District SDT lab re-tests results come back within tolerance, then the process ends here and reports are sent to IA**

project files and Project Engineer.

2. If the District SDT laboratory re-test results again identify a laboratory/field out-of-tolerance condition, IA staff will require a second re-test of the submitting technician and materials sample as soon as possible. The following options are available and IA staff will determine which option will be used on a case-by-case basis:
 - A different IA staff inspector may perform the review.
 - The test equipment can either be exchanged with different equipment or testing be performed at another qualified laboratory
 - All test equipment involved with the out-of-tolerance sample will undergo an efficiency and calibration analysis, including a thorough accuracy and calibration check for scales.
 - The following provide examples of how the process could proceed:

Example #1: Perform the *field testing* in a different field laboratory location on different equipment. The appropriate MnDOT Specialty Unit will be notified of the subsequent tolerance failures, and the IAST materials sample *may* be sent to SDT laboratory in a different District.

Example #2: Carefully take and split a materials sample in the field laboratory, remove, check, and clean the sieve nest, and closely inspect the shaker for appropriate floor mounting, levelness, and “proper action” on the sieves. The sample would be weighed and shaken while taking note of the shaking time. Sieve efficiency and analysis will be closely monitored and material from each sieve and bottom pan will be carefully collected and recombined. The recombined sample should be taken to another laboratory and shaken using different equipment. If the tolerance is less than 1%, the shaker/sieve can be ruled out as a cause. Again, all scales will be rechecked for accuracy and calibration.

If the District STD laboratory, other laboratory, or other equipment re-test results fall within tolerance, the process is complete and reports are sent to IA project files, the DME, the MnDOT Specialty Unit(s) involved, and the Project Engineer.

500.4 **Tolerance: (Third Party) Disagreement Resolution Process**

1. If the procedures and recommendations in Section 500.3 are followed, and re-training or suspension does not solve the tolerance issues, a Third-Party Disagreement Resolution process involving DIA staff, the TCP Audit Unit, and the DME may be used. This process is *similar* to, but not

the same as, the [process used by the Bituminous Unit](#).

- Third party resolution testing shall be performed by a neutral, dispute resolution certified AASHTO accredited laboratory that is mutually agreed upon by all parties.
 - The resolution process will begin as soon as practical and completed in a timely manner. Results will be sent out to all parties as they become available.
 - Test reports will be sent to all stakeholders involved with the tolerance issue.
 - **The test results of the disagreement resolution laboratory materials testing will be considered the actual test results of the tolerance testing, and therefore, will be used as the final outcome of the tolerance issue(s) and conclude the process.**
2. Appeals to the final outcome of the Disagreement Resolution can be done by providing reasons, background, and supporting documentation to the DME. The appellant must send the reviewer (DME) the appeal and supporting documentation within 14 calendar days from the date of the final outcome of the Disagreement Resolution was distributed.
 3. Appeals to a 6 month testing suspension can be done by sending explanations and supporting documentation to the State Construction Engineer (SCE). The appellant must send the reviewer (SCE) the appeal and supporting documentation within 14 calendar days from the date on which the notice of the suspension was distributed.
 4. Appeals to a Certification Revocation can be done by sending explanations and supporting documentation to the TCP Audit Unit. The appellant must send the reviewer (TCP Audit Unit) the appeal and supporting documentation within 14 calendar days from the date the notice of revocation was distributed. Upon receipt of an appeal, the IA staff who recommended revocation will prepare a memorandum or e-mail to respond to the appeal and provide supporting documentation. The TCP Audit Unit has final say in Certification Revocation. See the “Revocation of Certification” Section in the current [Technical Certification Handbook](#) for exact details of this process.

600 Appendices

600.1 IAIG Phone List

www.dot.state.mn.us/materials/PDF/iaig-phone-list.pdf

600.2 Acronymns & Definitions

This section outlines some of the general design-build terms used within this document. The intent of this section is to provide a quick reference of commonly used terms for individuals with little or no design-build experience. This is not an all-inclusive list of terms used within the design-build contract.

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| AASHTO | The American Association of State Highway and Transportation Officials is a standards setting body which publishes specifications, test protocols and guidelines which are used in highway design and construction throughout the United States. Despite its name, the association represents not only highways but air, rail, water, and public transportation as well. |
| Acceptance Program | All factors that comprise the STDs determination of the quality of the product as specified in the contract requirements. These factors include verification sampling, testing, and inspection, and may include results of quality control sampling and testing. (23 CFR 637B) |
| Accredited Laboratory | Accreditation for a laboratory in the IA program, this applies to testing performed within the confines of the designated STD laboratory accredited by using AASHTO testing criteria. Temporary facilities, including trailers or other structures set up for a specific job in the field and the personnel and equipment associated with them, are not accredited. |
| ACI | American Concrete Institute |
| ADE | Assistant District Engineer for Construction |
| AE | Administrative Engineer |
| ANSI | American National Standards Institute. |
| ASTM | The American Society for Testing and Materials International is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. |
| ATP | Area Transportation Partnership (MnDOT State Districts) |
| CCRL | ASTM Cement and Concrete Reference Laboratory |
| CFR | According to the Code of Federal Regulations (Title 23, Part 637), each STD shall develop a quality assurance program which will assure that the materials and workmanship incorporated into each |

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| | Federal-aid highway construction project on the NHS are in conformity with the requirements of the approved plans and specifications, including approved changes. |
| DIA | District Independent Assurance |
| DL | District Laboratory |
| DME | District Materials Engineer |
| EDMS | MnDOT's Electronic Document Management System uses software to store, organize, and retrieve documents in order to enable simultaneous review, and to maintain document versions and a historical record of creation, edits, and use. |
| FHWA | The Federal Highway Administration Division Offices are local field offices that provide leadership, guidance, and direction to State Departments of Transportation in the planning, construction and maintenance of transportation projects. |
| IA | Independent Assurance reviews activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the State Department of Transportation acceptance program. Test procedures used in the acceptance program which are performed in the State Transportation Department's Central/District laboratories would not be covered by an Independent Assurance program. |
| IAI | Independent Assurance Inspectors are SDT-qualified personnel observing procedures performed by certified sampling and testing personnel |
| IAIG | The Independent Assurance Inspector Group is a statewide organization that is comprised of the IA inspectors from Districts 1, 2, 3, 4, Metro, 6, 7, and 8. |
| IAS | If an STD uses the Independent Assurance System approach to the IA program, then they shall provide an annual report to the FHWA summarizing the results of the IA program. |
| IAST | The Independent Assurance Sampling & Testing is the overall program combining all areas of the IA program |
| MEO | The Materials Engineers Organization is a formal organization which maintains the relationship between the MnDOT Districts and the Office of Materials and Road Research to exchange ideas and provide strong leadership on pavement and materials issues. |
| MnDOT | The Minnesota Department of Transportation oversees transportation by land, water, and air in the U.S. state of Minnesota. The cabinet-level agency is responsible for maintaining the state's trunk highway system, including state highways, U.S. highways, and |

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| | interstate highways. |
| NHS | The National Highway System is a network of strategic highways within the United States, including the Interstate Highway System and other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transport facilities. Altogether, it constitutes the largest highway system in the world. All routes on the Interstate system are a part of the NHS. |
| Nuke | Nuclear Testing Device |
| OCIC | MnDOT's Office of Construction and Innovative Contracting provides construction and construction contract governance, contract administration, expertise, tort guidance, and training to public and private sector entities |
| OM&RR | MnDOT's Office of Materials and Road Research provides construction expertise and guidance Statewide from the Specialty Units, Engineering Sections, and Materials testing lab. |
| QC/QA | Quality Control/Quality Assurance |
| SALT | State Aid for Local Transportation |
| SCE | State Construction Engineer |
| SMC | Schedule of Materials Control |
| SDT | State Department of Transportation is the designation given to all state departments of transportation by the Federal Government in the CFR details. |
| TCP | MnDOT administers its Technical Certification Program statewide and includes technician training, written and performance testing, granting full certifications and issuing certification cards for both public and private sectors. |
| Tolerance of a Measuring Instrument | The extreme values of an error permitted by specifications, regulations, etc., for a given measuring instrument. |
| Verification Sampling and Testing | The sampling and testing performed to validate the quality of a product. (23 CFR 637B) |

600.3 **Code of Federal Regulations (CFR) 23 PART 637, Subpart B- Quality Assurance Procedures for Construction.**

Electronic Code of Federal Regulations

www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=23:1.0.1.7.25

Pdf Version (2015)

www.gpo.gov/fdsys/pkg/CFR-2015-title23-vol1/pdf/CFR-2015-title23-vol1-part637.pdf

600.4 **IAST Job Field Guide**

www.dot.state.mn.us/materials/labiast.html

600.5 **FHWA Tech Brief: Independent Assurance Programs**

<https://www.fhwa.dot.gov/pavement/materials/hif12001.pdf>