

California Department of Transportation



Independent Assurance Manual

*Procedures for Accreditation of Laboratories
and Qualification of Testers*

JULY 2005

ISSUED BY:

DIVISION OF ENGINEERING SERVICES,
MATERIALS ENGINEERING AND TESTING SERVICES

TRANSITION TO IMPLEMENTATION OF NEW GUIDELINES

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

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SUMMARY OF REVISIONS

Following is a summary of major revisions from the January 1, 2001, *Independent Assurance Program Manual*.

- Format is revised using language from Title 23, *Code of Federal Regulations*, Chapter I, Part 637 (23 CFR 637), and more closely modeling AMRL guidelines.
- Roles and responsibilities are listed for Construction Engineer and Resident Engineer.
- Roles and responsibilities are embellished for others to clarify roles.
- Reporting requirements were added to clarify reporting needed for annual reports and documentation of the program.
- The content organization was changed to allow the reader easier access to sections needed without reading the manual from cover to cover.

The program manual is available at the Independent Assurance (IA) Program website:

<http://www.dot.ca.gov/hq/esc/Translab/IAP.htm>

It replaces the document dated January 2001, *Independent Assurance Program Manual*. This manual, along with Chapter 6 of the California Department of Transportation (Caltrans) *Construction Manual*, constitutes the procedures for Caltrans quality assurance.

Personnel from the Federal Highway Administration (FHWA) and from the Caltrans IA Program, the Divisions of Construction and Local Assistance, the Division of Engineering Services' Materials Engineering and Testing Services (METS), and District Materials Engineers reviewed and provided input to this manual.

INDEPENDENT ASSURANCE MANUAL

This manual discusses the objectives for the Caltrans Independent Assurance (IA) Program and the program's component—staff certification, tester qualification, laboratory accreditation, annual reporting, and dispute resolution. An overview and the procedures and reporting requirements for each program component are described in individual sections.

This *Independent Assurance Manual* contains the guidelines established by Caltrans, and agreed to by the FHWA, for independent assurance on roadway construction projects. This manual is presented in two sections:

- Section 1: Describes the Caltrans IA Program, including the federal regulations pertaining to quality assurance and independent assurance, and roles and responsibilities of the Division of Construction, METS, districts, testers, and laboratories.
- Section 2: Describes the five components of the IA Program—IA staff certification, tester qualification, laboratory accreditation, annual reporting, and dispute resolution. An overview, the procedures, and reporting requirements for each program component are described in individual subsections.

References such as IA contacts, IA-related websites, a glossary of terms, 23 CFR 637 (federal law pertaining to quality assurance and independent assurance), and sample forms are appendices to this manual.

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1. OVERVIEW OF THE INDEPENDENT ASSURANCE (IA) PROGRAM

Independent Assurance (IA) is an important and integral part of the California Department of Transportation (Caltrans) Quality Assurance Program. The IA Program for Caltrans is a system-based program which can be described as a program which “tests the testers” to ensure that the laboratories, equipment, and testers providing test results to Caltrans projects are capable of performing tests and producing test results that are consistent with the standards set forth by the state.

Quality assurance at the project level is outlined in the Caltrans *Construction Manual* and contract special provisions. All laboratories and testers providing test results for construction materials must be reviewed and accredited/qualified by the IA Program. Testing must be performed at prescribed frequencies, and records must be maintained in a manner consistent with approved standards. The *Construction Manual* is available at:

<www.dot.ca.gov/hq/construc/manual>

This *Independent Assurance Manual*, along with Chapter 6 of the *Construction Manual*, describes Caltrans procedures for quality assurance. The *Independent Assurance Manual* is available at:

<<http://www.dot.ca.gov/hq/esc/TransLab/IAPMasterList/>>

Caltrans IA staff are listed in Appendix A. Any updates to Appendix A can be found on the IA Program website listed above. Appendix B presents websites related to the Caltrans IA Program.

1.1. IA Program

The objective of the IA Program is to provide a mechanism for formally recognizing the competency of a testing laboratory to perform specific tests on construction materials. It is a program available to laboratories including commercial laboratories, local agency laboratories, and Caltrans laboratories, and participation in this program is required for those laboratories and testers providing test results for contract acceptance considerations on Caltrans and National Highway System (NHS) projects.

The IA Program consists of five program components, described in Section 2:

1. IA staff certification.
2. Tester qualification.
3. Laboratory accreditation.
4. Annual reporting.
5. Dispute resolution – suspension, revocation, appeals, and reinstatement.

Caltrans has had an FHWA-approved IA Program since 1991. In 1994, Caltrans shifted from a project-based process for reviewing the testers, equipment, and results using project-related samples to a system-based process. In the system-based process, a tester's qualifications are ascertained by written examinations, witnessed performance of tests, and results of testing on proficiency samples of materials. Also, equipment calibration and laboratories are reviewed annually by Caltrans IA staff. This approach removes the necessity for project—specific samples.

1.2. Regulations

The Federal Highway Administration's (FHWA's) quality assurance requirement described in Title 23, *Code of Federal Regulations*, Chapter I, Part 637 (23 CFR 637), "Construction Inspection and Approval," generally states that each state highway agency (SHA) shall develop a quality assurance 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 Caltrans plans and specifications.

Appendix D presents 23 CFR 637, Subpart B, "Quality Assurance Procedures for Construction," which outlines a quality assurance program that makes SHAs, such as Caltrans, 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 proficiency samples.
- Testing personnel be evaluated by observation and proficiency samples.
- Proficiency test results be evaluated and that guidelines be developed, including tolerance limits, for the comparison of test results.
- SHAs using a system approach report annually to the FHWA summarizing the efforts of the IA program.

1.3. Roles and Responsibilities

This subsection describes roles and responsibilities for the implementation of the Caltrans IA Program. Details of the procedures to be followed are further described in Section 2 of this manual.

1.3.4. Headquarters Roles and Responsibilities

- 1.3.4.1. The **Division of Construction** is responsible for setting statewide policies or processes that deal with contract administration issues.

The Division of Construction is also responsible for developing, maintaining, and administering the Quality Assurance Program.

Division of Construction staff:

- 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.

1.3.4.2. **Materials Engineering and Testing Services (METS)** is responsible for directing and managing the IA Program.

METS staff:

- Maintain current IA certification.
- Develop and maintain the *Independent Assurance Manual*.
- Train and certify district IA staff.
- Develop and maintain the statewide database of IA staff, testing personnel, and accredited laboratories.
- Develop, update, and maintain statewide test method written examinations for uniformity.
- Qualify testers and accredit laboratories within the METS.
- Report annually by December 15 to the METS IA Program Coordinator.
- Prepare, distribute, and evaluate results from reference samples.

METS IA staff provide qualification review, testing, and certification for Transportation Laboratory (TransLab) laboratories and testers that perform quality assurance testing for construction projects. This involves the aggregate, asphalt binder, asphalt concrete, cement, portland cement concrete, soils, and units.

It is the responsibility of METS IA staff to maintain tester qualifications, laboratory accreditation, and equipment calibration for the aggregate, asphalt binder, asphalt concrete, cement, portland cement concrete, and soils testing laboratories such that both the Caltrans IA and the FHWA-required AASHTO standards are maintained. METS aggregate, asphalt binder, asphalt concrete, cement, portland cement concrete, and soils laboratories are AASHTO accredited.

METS continues to provide calibration services for all large equipment within district and METS laboratories and to local agency laboratories.

1.3.5. Districts

The IA Program in each district is the direct responsibility of the District Materials Engineer, a senior-level engineer. Depending on district or region structure, the District Materials Engineer is managed by either Engineering Services or by Construction.

1.3.5.1. **District IA staff** maintain current certification by participating in annual meetings and reviews of their qualifications and processes.

District IA staff:

- Maintain current IA certification.
- Implement and administer the program at a district level.
- Qualify, requalify, and disqualify Caltrans, local agency, and private sector testers.
- Accredite, reaccredite, or revoke accreditation of Caltrans, local agency, and private laboratories.
- Calibrate or verify the calibration status of all equipment used for testing involving California Test (CT) methods and AASHTO and ASTM test methods used on Caltrans projects.
- Prepare, distribute, and evaluate results from split samples.
- Witness tests as tests are being performed.
- Document IA activities, including reports as listed in each component of the program as applicable to the district.
- Maintain a secure location for confidential IA records and materials.
- Report annually by December 15 to the METS IA Program Coordinator.
- Assist METS staff with process/peer reviews of the IA Program in the districts.
- Notify the METS IA Program Coordinator of any problems relating to the IA Program.
- Update IA databases with tester and accreditation data.

1.3.5.2. **District Construction** manages all construction contracts in accordance with statutory requirements, Caltrans directives, and Division of Construction policies. District Construction is responsible for implementing and administering the Quality Assurance Program outlined in Chapter 6 of the *Construction Manual* (website listed in Appendix B).

1.3.5.2.1. The **District Construction Engineer**:

- Ensures that materials and completed work comply with plans, specifications, and design criteria.
- Signs each project “Materials Certification” memorandum, certifying that results of tests on acceptance samples that indicate the material incorporated in the construction work controlled by sampling and testing are in conformity with the approved plans and specifications.

1.3.5.2.2. The **Resident Engineer**:

- Ensures that no tests or samples are taken on Caltrans projects unless the tester is qualified in the test being performed.
- Ensures that laboratories used for acceptance testing meet the accreditation specified for the test being performed.
- Prepares the “Materials Certification” memorandum that certifies results of tests on acceptance samples that indicate the material incorporated in the construction work controlled by sampling and testing are in conformity with the approved plans and specifications. Any material exceptions, in which a contract change order was written to accept the material, need to be included with the material certification in order to be accepted.
- Notifies the district IA staff of any problems/issues regarding competency of laboratories, testers, or equipment calibration.

1.3.5.3. **Laboratories and testers**, whether state, local agency, or private, providing construction materials testing for Caltrans projects or projects on the NHS are required to be familiar with the requirements of the Caltrans IA Program.

1.3.5.3.1. The **Laboratory**:

- Maintains current Caltrans IA accreditation.
- Performs acceptance tests only for which it is currently accredited.
- Demonstrates the capability of performing tests according to the current version of test specifications.
- Provides qualified testers.
- Develops, implements, and maintains a quality control system that is documented in the laboratory quality control manual.

- Maintains facilities that are safe and adequate for the testing required.
- Maintains calibrated equipment.
- Maintains equipment records indicating all repairs and calibration dates for uniquely identified test equipment.
- Makes facilities, equipment, and testers accessible to IA staff upon request.

1.3.5.3.2. The **Tester**:

- Maintains current Caltrans IA qualification.
- Performs acceptance tests only for which he/she is currently qualified.
- Prepares clear and accurate test results.
- Notifies the Resident Engineer immediately of any failing test results.
- Receives training prior to seeking Caltrans qualification for applicable test methods.
- Ensures that equipment is functioning correctly, is properly calibrated, and has a valid calibration decal attached.

1.3.6. **Local Agencies:** For IA Program standards on local agency construction projects, refer to the *Local Assistance Procedures Manual* for additional information. Projects on the NHS or joint local agency/Caltrans projects shall follow Caltrans quality assurance procedures as listed in the *Construction Manual* and follow this *Independent Assurance Manual*.

2. PROGRAM COMPONENTS

2.1. IA Program Overview

The IA Program consists of five program components:

1. IA staff certification.
2. Tester qualification.
3. Laboratory accreditation.
4. Annual reporting by March 15 to Caltrans management, district IA staff, and the FHWA.
5. Dispute resolution – suspension, revocation, appeals, and reinstatement.

2.2. IA Staff Certification

2.2.1. IA Staff Certification Overview

All Caltrans district IA staff must be certified and maintain a valid IA Certificate of Completion, Form TL-0100 (see Appendix I). Once certified, district IA staff must maintain certification by attending an annual two-day refresher course sponsored by METS.

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

It is the IA staff's responsibility to qualify testers on test methods as needed. California Test (CT) methods and AASHTO and ASTM test methods are available on the applicable websites listed in Appendix B. METS IA staff will assist district IA staff in becoming familiar with test methods.

2.2.2. IA Staff Certification Procedures

2.2.2.1. IA Staff Certification

District IA staff must have and maintain a valid IA Certificate of Completion, Form TL-0100 (see Appendix I).

District staff applying to be newly certified as district IA staff must attend a two-day training course conducted by METS IA staff (including information related to IA roles and responsibilities plus training regarding the most recently revised test methods); take and pass written examinations regarding the *Independent Assurance Manual*, the IA process, and randomly chosen test methods; and may be witnessed performing some of the tests they will be qualifying other testers to perform. Upon successful completion of the course, review, and testing, the district IA staff will be issued an IA Certificate of Completion that is valid for one year.

Once certified, district IA staff must maintain the certification by attending an annual two-day refresher course. The refresher course covers a review of the *Independent Assurance Manual*, any policy changes implemented in the program, and reviews of significant test methods. Failure to attend the annual refresher course may result in non-renewal of certification. In addition, district IA staff must successfully complete a METS review of the district's IA records and pass written examinations and proficiency testing (witnessing) of some of the test methods the IA Program staff will be certifying.

2.2.2.2. Process/Peer Review of IA Staff

Annually, a process/peer review will be performed to verify compliance with Caltrans policies regarding independent assurance. The review will consist of an examination of IA documents, records, and procedures. This review will be performed by METS staff and, when possible, METS staff will be accompanied by certified district IA staff from another district.

2.2.3. IA Staff Certification Reporting Requirements

2.2.3.1. Developing and Maintaining the Statewide Database of IA Staff

District IA staff maintain centralized records of testers and laboratories, and METS staff have always had access to those records. However, with the implementation of QC/QA for asphalt concrete and new specifications for fast-setting portland cement concrete, there is an increased need for qualifying private testers and accrediting private laboratories that may perform testing in several districts. Thus, there is a need for a centralized statewide database.

METS has established a database on the Internet that provides names and certifications of testers and accreditation status of laboratories, both state and private, statewide. The tester database can be sorted by district or by tester. The laboratory database is alphabetized by the name of the laboratory. Presently the database is being used on a pilot basis by some districts. The vision is that after input regarding needed revisions from database users, revisions will be made to the database and then all districts will adopt the database.

METS is working with the Caltrans Information Technology group to develop and implement an interactive statewide database of tester and laboratory qualification data. This database will be comprehensive, providing historical as well as current information to both the districts and METS.

2.2.3.2. District IA Record Keeping and Reporting

District IA staff shall maintain all records in accordance with this manual.

By December 15 each year, district IA staff must submit the report for the year of December 1 of a given year through November 30 of the following year. The IA staff must submit the reports to the METS IA Program Coordinator on or before December 15. Failure to report accordingly may result in non-renewal of certification.

2.3. Tester Qualification

2.3.1. Tester Qualification Overview

At the project level, the Caltrans quality assurance process requires that only qualified testers and accredited laboratories provide test results on which acceptance decisions are based.

A tester's thorough knowledge includes:

- Responsibilities of sampling and testing.
- Test methods, calculations, and related paperwork.
- Safety guidelines used in the test methods.
- Maintenance/operation of the equipment used in the test procedures.

Testers will contact their district IA staff to initiate or renew the Caltrans qualification process. See Appendix A for a list of district IA staff. A list of district IA staff with updates is also available at:

<<http://www.dot.ca.gov/hq/esc/TransLab/IAPMasterList/>>

2.3.2. Tester Qualification Procedures

When a tester becomes qualified in a given test method, the qualification is valid for one year. Testers with expired qualifications will begin the qualification process by taking written tests for applicable test methods. Testers must be associated with an accredited laboratory.

2.3.2.1. Written Examination

The district IA staff will review the training records (see Appendix I) to determine the adequacy of training prior to the qualification process. If an applicant does not have sufficient documentation of training, the applicant will supply adequate documentation of training within one week. Testers must pass a written examination for each test method. The written examination requires a thorough knowledge of the test method. It is the tester's responsibility to schedule the written examination with the district IA staff. The written examination is administered and proctored by the district IA staff. **All examinations are closed book.** Each examination consists of no more than ten multiple-choice questions. A maximum time limit for each examination is 30 minutes. A passing score of 70 percent is required. Failure to pass the written examination will result in the following mandatory waiting times:

- First failure 7 calendar-day wait before reexamination
- Second failure 21 calendar-day wait before reexamination
- Third failure 3-month wait before reexamination
- Fourth failure 9-month wait before reexamination

All examination materials are confidential Caltrans property. Any tester found with confidential Caltrans IA examination materials outside of an IA proctored examination will be immediately disqualified for five years.

2.3.2.2. Practical Examination

Once the tester has passed the written examination, the tester will then need to successfully demonstrate the test procedure for the district IA staff. This practical review by the district IA staff shall be completed within three months of passing the written examination. The practical examination will be located at a site selected by the district IA staff. The practical examination will not be used for acceptance program testing or to verify specification compliance on construction projects. It is the tester's responsibility to schedule the practical examination with the district IA staff.

The practical examination will consist of the following:

- The tester will present his/her test equipment to the IA staff for inspection. The IA staff will inspect the equipment for compliance with the test procedure, safety requirements, and to verify a valid calibration decal is attached (if applicable). The IA staff will verify equipment calibration randomly and as needed.
- The tester will demonstrate the test procedure for the IA staff.
- The tester will perform all calculations required by the test method and will completely and correctly prepare the associated paperwork.

Failure to pass the practical examination will occur if improper test equipment is presented, if an uncorrected error in proper test procedure occurs while demonstrating the test procedure, or if the tester fails to complete the paperwork or calculations correctly. Failure to pass the practical examination will result in the following mandatory waiting periods:

- First failure 7 calendar-day wait before reexamination
- Second failure 21 calendar-day wait before reexamination
- Third failure 3-month day wait before reexamination
- Fourth failure 9-month wait before reexamination

2.3.2.3. Maintaining Caltrans Qualification

The tester will be responsible for maintaining Caltrans proficiency testing. Testers must successfully perform proficiency corroboration and witness tests as listed in the procedural sections for corroboration testing and witness testing. Testers that do not successfully perform corroboration and witness tests will forfeit their qualification in the test methods being tested and any related test methods as deemed by the IA staff.

2.3.2.4. Disqualification of Testers

District IA staff always have the authority to disqualify testers that deviate from acceptable sampling and testing procedures. The IA staff have justification for disqualification of a tester for any of the following:

1. Using incorrect test equipment.
2. Using equipment with an invalid calibration decal or no calibration decal.
3. Incorrect sampling or incorrect testing procedures.
4. Failure to correctly perform calculations.
5. Failure to correctly complete paperwork.
6. Evidence of submission of fraudulent test results.

Testers will be disqualified for six months for all cases, except for evidence of submission of fraudulent test results. For the case of evidence of submission of fraudulent test results, the tester's qualifications will be revoked for one year.

Once an infraction has been detected, the district IA staff will issue a letter of disqualification to the tester and the associated laboratory manager. Caltrans will not accept test results obtained by a disqualified tester.

2.3.3. Tester Qualification Reporting Requirements

The tester qualification process is complete once the above steps have been satisfied for each test method desired. The district IA staff will then issue the tester a Caltrans Form TL-0111, "Qualified Certificate of Proficiency" (see Appendix I), valid for one year, listing the appropriate test methods.

By December 15 each year, district IA staff must submit the report for the year of December 1 of a given year through November 30 of the following year. The IA staff must submit the report regarding those testers tested, test results, retests, and those who drop out, or of other actions (i.e., reevaluations, suspensions, revocations, disqualifications, appeals, and reinstatements) to the METS IA Program Coordinator on or before December 15.

2.4. Laboratory Accreditation

2.4.1. Laboratory Accreditation Overview

When a laboratory becomes accredited, the accreditation is valid for one year. Laboratory accreditation verifies a laboratory's ability to perform quality materials testing. To be granted laboratory accreditation, a laboratory must pass the following four elements:

1. Site assessment.
2. Submittal of a complete laboratory accreditation manual.
3. Equipment calibration check.
4. Enrollment in and successful completion of proficiency sample testing (both reference samples and corroboration of split samples).

The laboratory must comply with the requirements for accreditation, supply information needed for the evaluation of the laboratory, and make the laboratory facilities, equipment, and testers available for evaluation.

For those test methods for which a laboratory is seeking accreditation:

- The laboratory shall maintain facilities for proper storage, handling, and conditioning of test specimens and samples.
- The laboratory shall maintain necessary calibration equipment and reference standards.
- The laboratory shall maintain facilities and equipment conforming to requirements necessary for the applicable test methods performed.
- The laboratory shall have a safe environment that does not adversely affect test results and shall have facilities for the effective monitoring, control, and recording of environmental conditions as appropriate.

The laboratory shall demonstrate the capability of performing tests according to the applicable version of test methods.

Laboratory accreditation applies to testing performed within the confines of the laboratory and testing performed in the field (on-site). Temporary facilities, including trailers or other structures set up for a specific job and the personnel and equipment associated with them, require separate accreditation. The accredited laboratory manager ensures any laboratories that may be used for sample preparation or partial testing of materials for which the accredited laboratory will be submitting test results is accredited by Caltrans IA staff.

Accreditation is granted on a test-by-test basis. If a laboratory has a deficiency in a specific test, it may choose to withdraw accreditation for the test method rather than respond to the deficiency.

The district IA staff evaluate a laboratory's accreditation status annually following the initial accreditation and whenever there is evidence to question a laboratory's conformance to accreditation requirements. The district IA staff will accredit laboratories for specific tests on aggregates, asphalt concrete materials, embankment and soils, structural materials, and portland cement concrete materials. A laboratory must hold current accreditation for any test for which it will be submitting test results for acceptance consideration on Caltrans projects.

Laboratories requesting accreditation or wishing to expand accreditation to include additional test methods must make arrangements to receive appropriate on-site assessments and proficiency samples. Requests for accreditation must be submitted 30 calendar days in advance.

The laboratory shall notify IA staff in writing within 30 calendar days of any major change in its capability to perform tests for which it is accredited; any change in laboratory ownership, location, managerial personnel, facilities, e-mail addresses, mailing addresses, or the phone numbers; and any other change which may affect the scope of its accreditation.

The laboratory shall pay all applicable fees charged for services required for accreditation.

2.4.2. Laboratory Accreditation Procedures

2.4.2.1. Site Assessment

2.4.2.1.1. Site Assessment Overview

A site assessment is one of the requirements for laboratory accreditation.

The site assessment requirements include a visit by IA staff to evaluate the apparatus operation, safety requirements, and procedures used to conduct the physical tests for which the laboratory requested accreditation. The IA staff will also determine if the laboratory's implementation activities are consistent with those specified in the laboratory's accreditation manual. The IA staff bases its on-site assessments on California Test (CT) methods or other tests for which the laboratory will be presenting results for acceptance on a Caltrans project.

Upon successful completion of the site assessment, the IA staff will reissue a Caltrans Form TL-0113, “Accredited Laboratory Inspection Report” (see Appendix I), valid for one year, and the laboratory’s status will be updated on the master list.

2.4.2.1.2. Site Assessment Procedures

A laboratory desiring on-site assessment:

- Contacts the district IA staff as listed in Appendix A or the most current IA staff list on the Caltrans IA Program website.
- Submits a laboratory accreditation manual, contents for which are listed in Appendix F. The manual will be reviewed by the district IA staff and any deficiencies will be reported to the laboratory. The district IA staff will schedule an inspection of the laboratory once the requesting laboratory has submitted the manual.

The district IA staff will perform a site assessment only after the laboratory accreditation manual has been received, reviewed, and approved. The IA site assessment of the laboratory will consist of a review of the following:

- Laboratory procedures manual (describing the methods used for recording, processing, and reporting data).
- Facility safety manual.
- Copies of current applicable test methods.
- Proper test equipment.
- Calibration and service documentation.
- Current calibration decals on all testing equipment.
- Laboratory accreditation manual (detailing laboratory quality control, quality assurance, and equipment calibration programs).

2.4.2.1.3. Deficiency Resolution Following an On-Site Assessment

If notified of a deficiency resulting from an on-site assessment, a laboratory must respond to the IA staff within 90 calendar days of the issuance of the final report. The response must include a description of the corrective action taken and substantiating evidence, such as records, copies of newly prepared or revised documents, equipment invoices, or photographs.

If more than 90 calendar days are needed to resolve a deficiency, the laboratory shall provide IA staff with a written plan for resolving the deficiency, including an estimated completion date and any evidence of action taken, such as equipment purchase orders.

Proposals for resolution of deficiencies will be reviewed and may result in accreditation being granted, denied, suspended, or revoked. Accredited laboratories will be suspended for conducting test methods affected by the deficiency, and the IA staff will notify any Resident Engineers with projects that may be affected.

The laboratory must provide the IA staff with satisfactory evidence that all deficiencies noted were corrected before the IA staff can grant accreditation. In most cases, this evidence will take the form of written documentation. Another visit to the laboratory may be required due to action or inaction by the laboratory management before accreditation can be granted.

If a laboratory does not resolve a deficiency within 180 calendar days of the issuance of the final report and desires to maintain its accreditation, an additional on-site assessment may be required.

2.4.2.1.4. Site Assessment Reporting

At the completion of each on-site assessment, the IA staff will hold a briefing conference with the laboratory supervisor to summarize the findings and point out deficiencies requiring correction (e.g., deviations from standard methods of test for which accreditation is requested or problems with the laboratory's quality system). The IA staff will leave a copy of a preliminary report identifying the deficiencies, signed by district IA staff and the laboratory manager. Upon returning to the office, the IA staff will prepare a report concerning the deficiencies and send it to the laboratory.

2.4.2.2. Calibration of Test Equipment

2.4.2.2.1. Calibration of Test Equipment Overview

Equipment used in materials testing for Caltrans and NHS projects must be calibrated as part of the laboratory accreditation process.

All materials testing equipment for field and/or laboratory use shall be calibrated prior to use and thereafter on an annual basis 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.
- California Test (CT) methods.
- AASHTO test methods.
- ASTM test methods.

2.4.2.2.2. Calibration of Test Equipment Procedures

Calibration

Field or laboratory equipment will not be used to perform tests on Caltrans and/or NHS federal-aid highway construction projects unless the equipment is properly calibrated and is uniquely identified. All equipment will be calibrated on an annual basis unless otherwise noted in the associated test method requiring a more frequent interval.

Laboratory managers are responsible for calibration of all equipment associated with test methods for Caltrans and NHS projects. METS continues to provide calibration services for all large equipment within district and TransLab laboratories and to local agency laboratories, as METS staff are available. A METS IA staff person calibrates all compactors, presses, and related equipment annually. Private laboratories are required to use private calibration services.

Calibration standards for test equipment are included in Appendix H, "Caltrans Standard Recommended Practice for the Calibration of Materials Testing Equipment."

Weights used for scales and balance calibration shall be traceable to the National Institute of Standards and Technology (NIST).

Examples of calibration for scales and ovens are included in Appendix H.

Calibration Decals

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

- Equipment identification number.
- Calibration date.
- Name of the calibrator.
- The next calibration date.

Calibration decals may be from a manufacturer or 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, recalibrated, and a new calibration decal affixed.

Maintenance

After initial calibration, 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.

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

Equipment that cannot be properly calibrated and uniquely identified will not be used.

2.4.2.2.3. Calibration of Test Equipment Reporting

All calibration, maintenance, and service will be documented and reporting documents will be stored for ten years. Form TL-0112, "Inventory of Materials Testing Equipment" (see Appendix I), can be used for this purpose. All Caltrans calibration records are to be kept in accordance with Materials Category 200 as shown in the "District IA Records Summary," Appendix I. METS IA staff will also keep Caltrans calibration records for the TransLab in accordance with Materials Category 200 as shown in the District IA Records Summary.

All non-Caltrans calibration records are to be reviewed and kept by the district IA staff under Materials Category 500 as shown in the District IA Records Summary. A completed Form TL-0112 included in the laboratory accreditation manual will suffice for non-Caltrans calibration records.

2.4.3. Proficiency Testing

The FHWA requires proficiency sample testing. The laboratory shall participate in all required proficiency sample programs to be accredited. Repeated occurrences of either nonparticipation or poor results will result in suspension of applicable accreditation.

Proficiency testing is used to monitor, ensure, and improve the quality of laboratory analytical results through the use of consistent samples having known mix proportions. The results submitted by the laboratories verify the accuracy (bias and variability) of laboratory equipment, testers, and practices. 23 CFR 637.203 defines proficiency samples as: “Homogeneous samples that are distributed and tested by two or more laboratories. The test results are compared to assure that the laboratories are obtaining the same results.”

Caltrans confirms a laboratory’s and a tester’s ability to test materials and provide accurate test results through proficiency sample testing including reference samples, corroboration samples, and witnessing of testers performing the tests for which they are qualified. Proficiency sample testing, corroboration sample testing, and observations are required by 23 CFR 637.

Proficiency testing is three-fold:

1. Proficiency testing with reference samples is managed by METS IA staff at Headquarters. Samples are manufactured and distributed, and results are analyzed and reported by METS.
2. Corroboration samples are distributed and results are analyzed and reported by district IA staff.
3. Witnessing of testing is performed in the districts by district IA staff and at the TransLab by METS IA staff.

2.4.3.1. Proficiency Testing With Reference Samples

2.4.3.1.1. Proficiency Testing With Reference Samples Overview

Reference samples are used to evaluate laboratory equipment and practices, tester competence, and the repeatability of the test methods. Proficiency testing of reference samples is a correlation-testing evaluation using a statistical evaluation method. The evaluation of the statewide reference sample results is an indicator of the quality of testing being performed statewide. It provides Caltrans and participating laboratories an opportunity to review individual laboratory performance against the statewide population.

At least once a year, samples are sent to Caltrans accredited and participating laboratories. The samples have complete testing instructions and a deadline by which the results must be reported.

2.4.3.1.2. Proficiency Testing With Reference Samples

Materials

Materials evaluated with reference samples include soil, aggregate, asphalt concrete, and portland cement concrete. Each year Caltrans evaluates laboratory performance with at least three of these four material types. Specific California Test (CT) methods and materials evaluated are designated in each cycle of the reference samples.

Fees

Laboratories are assessed a fee commensurate with the cost of preparing and shipping samples. Public agency laboratories are exempt from fees. Fees will be paid prior to receiving samples.

Participation

It is the laboratory's responsibility to contact both the METS IA staff and the district IA staff (see Appendix A for contact information) to initiate participation in proficiency testing of reference samples. A copy of the letter requesting participation in proficiency testing of reference samples should be kept and placed in the laboratory accreditation manual.

Maintaining Active Reference Sample Status

It is the laboratory's responsibility to maintain active status in proficiency testing of reference samples by testing and reporting the results. Notifications of reference samples are posted on the IA Program website (see Appendix B for website address). Notifications via e-mail will also be sent to laboratories regarding upcoming reference samples. If a laboratory performs test methods that are listed in a notification, the laboratory is to participate. It is also the laboratory's responsibility to notify the IA Program Coordinator of any changes in laboratory status such as telephone numbers, mailing addresses, e-mail addresses, or laboratory contacts.

Shipping of Materials

Samples are shipped at least annually to those laboratories participating in proficiency testing with Caltrans reference samples. Instructions are enclosed with each sample and are posted on the Caltrans IA Program website.

Testing of Materials

Material samples include testing instructions specific to the material to be tested, test result forms, and payment instructions. The laboratory conducts the tests according to the reference sample instructions and the applicable test methods.

2.4.3.1.3. Reference Sample Reporting

Reporting Reference Sample Results

Reference sample results must be reported on the forms provided and submitted in the manner required.

<p>By 2005, METS will be communicating all reference sample information by e-mail. Laboratories should register an e-mail address for contact and reporting purposes to the reference sample coordinator at METS.</p>

Failure to report the reference sample results by the deadline will result in being placed on the inactive listing for proficiency testing with reference samples. Laboratory accreditation and tester qualification for the tests involved will be removed if an active status is not maintained.

Reference Sample Results

Reference sample test results are evaluated using a statistical evaluation system for determining the numeric ratings of each test method. The statistical evaluation method uses the standard deviation from the mean for a given test method as indicated below.

TABLE 1: RATING SYSTEM FOR REFERENCE SAMPLES

STATISTICAL VALUE	NUMERICAL RATING	INTERPRETATION OF RESULTS
$X \pm 1.0\sigma$	5	Acceptable (very good)
$X \pm 1.5\sigma$	4	Acceptable (good)
$X \pm 2.0\sigma$	3	Acceptable (fair)
$X \pm 2.5\sigma$	2	Unacceptable (poor)
$X \pm 3.0\sigma$	1	Unacceptable (very poor)

Reference Sample Retests

If a rating score less than 3.0 is received for any test method performed, the laboratory is required to examine its equipment and/or test procedures to determine why the test results varied appreciably from the mean of the test results obtained by other laboratories. A second sample of material will then be shipped for retesting. The retest sample results must be returned to the METS reference sample coordinator within 15 calendar days of receipt of the retest sample.

If the results of the second test are acceptable and the cause(s) leading to the original deficiency are corrected and documented, the initial unacceptable rating is considered resolved.

If the results of the second material sample are once again below a 3.0 rating, the individual laboratory must contact the METS reference sample coordinator for assistance (see Appendix A or the IA Program website in Appendix B for contacts). Unacceptable ratings, if uncorrected, will result in loss of laboratory accreditation.

Final Reference Sample Report

A final reference sample report will be generated after all tests and retests are completed and will be mailed to all participants. The report will be posted on the Caltrans IA Program website listed in Appendix B. In addition, a letter of successful participation will be issued to all laboratories receiving a 3.0 or higher rating for each test method. Copies of these documents are to be kept in the laboratory accreditation manual. METS IA staff will distribute reference sample results to all IA staff.

2.4.3.2. Proficiency Testing With Corroboration Samples

2.4.3.2.1. Proficiency Testing— Corroboration Sample Overview

Purposes of a corroboration test are to verify that proper test method procedures are being followed, that the tester is using properly calibrated equipment, and that the tester is proficient at performing the test method. The IA staff will either fabricate the corroboration sample or produce a split sample to be assigned to the tester.

Testers receiving samples for corroboration testing must be Caltrans qualified in the test methods being corroborated.

2.4.3.2.2. Proficiency Testing— Corroboration Procedures

IA staff are responsible for conducting corroboration tests (using split samples) of qualified testers at annual intervals for the following California Test (CT) methods:

- CT 202 Sieve Analysis
- CT 217 Sand Equivalent
- CT 227 Cleanness Value

Passing the written tests for CT 105, “Calculations Pertaining to Gradings and Specific Gravities,” and CT 201, “Soil and Aggregate Sample Preparation,” is required prior to receiving a corroboration sample for any of these tests.

The tester will be assigned a corroboration sample and required to perform the indicated test and report the results to the district IA staff within 48 hours. The IA staff must use equipment different from that of the tester.

The corroboration of the test results will be based on the degree of corroboration determined in comparing the tester's results to the IA results. Scores will be determined as follows:

**TABLE 2:
CALTRANS IA CORROBORATION TEST RESULTS**

CT METHOD	DESCRIPTION OF TEST PROCEDURE	DEGREE OF CORROBORATION*		
		GOOD	FAIR	POOR
202	SIEVE ANALYSIS			
	4.75 mm sieve and larger (no. 4 sieve and larger)	≤ 2	3-4	≥ 5
	2.36 mm to 0.60 mm sieve (no. 8 to no. 30 sieve)	≤ 2	3	≥ 4
	0.30 mm to 0.15 mm sieve (no. 50 to no. 100 sieve)	≤ 2	3	≥ 4
	0.075 mm sieve (no. 200 sieve)	≤ 1	2	≥ 3
217	SAND EQUIVALENT	≤ 3	4-5	≥ 6
227	CLEANNES VALUE	≤ 3	4-6	≥ 7

* Degree of corroboration is the absolute value of the difference between the tester's result and the IA test result.

In the case of poor corroboration, it is the responsibility of the tester for taking corrective action to resolve the poor corroboration. If defective equipment is discovered, the defective equipment must be repaired or replaced immediately or the defective equipment must immediately be tagged defective and taken out of service.

After corrective action is taken and documented in a letter submitted to the district IA staff, a second corroboration sample will be issued to the tester with the same protocols as the first corroboration sample. If a good or fair corroboration is achieved, the poor corroboration will be considered resolved and documented accordingly.

If a poor corroboration still exists after two corroboration samples, the IA staff are required to go to the tester's location with a third corroboration sample and observe the tester performing the test procedure. At this point, a reason for the lack of satisfactory corroboration should be determined by the IA staff and documented.

A tester with three consecutive poor corroboration results for a specific test will be disqualified for that test and subject to the requalification process.

2.4.3.2.3. Proficiency Testing— Corroboration Sample Reporting

The tester is to report the test results on Form TL-0107, “Corroboration Test Form” (see Appendix I).

When test results from the tester’s corroboration sample are received, it is the responsibility of the IA staff to complete Form TL-0104, “Corroboration Report Form” (see Appendix I).

2.4.3.3. Proficiency Testing by Witnessing

2.4.3.3.1. Witness Testing Overview

The purpose of the witness test is to verify the test method procedures and verify the working condition and calibration of the test equipment. At the discretion of the IA staff, witness tests may be either at a project site or at any other suitable site. District IA staff are responsible for conducting witness tests of qualified testers at annual intervals. A listing of current test methods is on the Internet (see Appendix B).

2.4.3.3.2. Witness Testing Procedures

The witness test will consist of the following:

- The tester will present the test equipment to the IA staff for inspection. The IA staff will inspect the equipment for compliance with the test procedure and to verify a valid calibration decal is attached (if applicable). The IA staff will randomly, and if appropriate, check calibration.
- The tester will demonstrate the test procedure for the IA staff.
- The tester will perform all calculations required by the test method and will completely and correctly prepare the associated paperwork.

Failure to pass the witness test will occur if improper test equipment is presented, if an uncorrected error in proper test procedure occurs while demonstrating the test method, or if the tester fails to complete the paperwork or calculations correctly. Failure to pass the witness test will result in the following mandatory waiting periods:

- First failure 7 calendar-day wait before reexamination
- Second failure 21 calendar-day wait before reexamination
- Third failure 3-month wait before reexamination
- Fourth failure 9-month wait before reexamination

2.4.3.3.3. Witness Test Reporting

Following a witness test, it is the responsibility of the IA staff to properly complete Form TL-0103, “Report of Witness Test,” and Form TL-0110, “Independent Assurance Log Summary” (see Appendix I).

By December 1, the district IA staff must submit calendar year information (estimating December) regarding witness tests to the METS IA Program Coordinator. By December 15 each year, the district IA staff must submit the report for the year of December 1 of a given year through November 30 of the following year. The IA staff must submit the report of regarding witness tests to the METS IA Program Coordinator on or before December 15.

2.4.4. Laboratory Accreditation Reporting

Once the laboratory initiation process and the laboratory inspection process have been satisfactorily completed, the district IA staff will issue Form TL-0113, “Caltrans Accredited Laboratory Inspection Report” (see Appendix I), valid for one year. The certificate will be sent to the laboratory within 30 days of the completion of the review.

The names of all Caltrans qualified laboratories are to be placed on Form TL-0108L, “Master List of Caltrans Accredited Laboratories” (see Appendix I). The master list is to be kept in the district’s records and submitted to METS. The master list is available on the Internet at:

<http://www.dot.ca.gov/hq/esc/TransLab>

By December 15 each year, the district IA staff must submit the report for the year of December 1 of a given year through November 30 of the following year. The IA staff must submit information regarding laboratory accreditations and those who drop out or do not pass accreditation.

Guidance for required record keeping is listed in Appendix I.

2.5. Dispute Resolution

2.5.1. Overview of Dispute Resolution

Dispute resolution means the process of denial, suspension, revocation, appeals, and reinstatement for IA staff certification, tester qualification, or laboratory accreditation.

Denial is the action taken when district staff requesting IA certification, a tester requesting qualification, or a laboratory requesting accreditation is denied certification, qualification or accreditation (as appropriate) for failure to meet the requirements for initial certification, qualification, or accreditation or for recertification, requalification, or reaccreditation.

Suspension is the action taken when IA certification, tester qualification, or laboratory accreditation is temporarily suspended due to failure to meet the requirements of the Caltrans IA Program. In most cases this condition is temporary due to equipment damage or problems, loss of key personnel, change in laboratory location, failure to pay fees, or failure to resolve deficiencies related to the requirements of the Caltrans IA Program.

Revocation is the action taken when IA certification, tester qualification, or laboratory accreditation is withdrawn for an extended period of time due to

failure to meet the requirements of the Caltrans IA Program. In most cases this condition is due to major problems by the individual or laboratory involved or the deficiencies are too major and/or numerous to be corrected in a reasonable time. Revocation may also occur if the IA staff, tester, or laboratory acts in such a manner as to bring Caltrans into disrepute or makes any statements relative to its certification, qualification, or accreditation that Caltrans considers false or misleading.

Suspension or revocation is not necessarily tied to the review process and may occur at any time for cause. A tester or laboratory may have its entire qualification or accreditation or its qualification or accreditation for specific test methods suspended or revoked if it is found not to conform to IA accreditation requirements. Notices of denial, suspension, or revocation will be sent by e-mail to Caltrans staff and laboratories and by mail to testers and laboratories outside Caltrans.

After receipt of a notification of denial, suspension, or revocation, IA staff, a tester, or a laboratory may voluntarily withdraw its certification, qualification, or accreditation or enter an appeal. If the decision is appealed within 30 calendar days of notification, the proposed suspension or revocation may be stayed pending the outcome of the appeal.

During the period of denial, suspension, or revocation, an IA staff is prohibited from participating in qualification or accreditation activities related to this IA Program. During the period of denial, suspension, or revocation, a tester or laboratory is prohibited from participating on Caltrans and NHS projects for testing of test methods related to the suspension. Additionally, the listing of IA staff, qualified testers, or accredited laboratories will show the status as denied, suspended, or revoked.

2.5.2. Procedures for Dispute Resolution

2.5.2.1. Appeal Procedure for IA Staff

An IA staff appeals by sending explanations and supporting documentation to the reviewer at the next highest level. Those levels of appeal are defined as (1) the Chiefs of the Office of Flexible Pavement Materials and the Office of Construction Engineering, and (2) the Deputy Division Chief of METS and the Chief of the Division of Construction. The appellant must send the reviewer the appeal and supporting documentation within 14 calendar days from receiving notice of denial, suspension or revocation. Upon receipt of an appeal, the METS IA staff who denied, suspended, or revoked the IA certification prepares a memorandum or e-mail for responding to the appeal and the IA staff supporting documentation.

The appellant is notified of the decision on the appeal by e-mail or certified mail. Decisions are mailed within 14 calendar days from when the decision is made by the reviewer. If the appeal is denied, the notification letter will include the reason for the denial, suspension, or revocation, and information on the next-level appeal process that is available. If the IA staff decides to resolve the issue, the IA staff must provide the METS IA staff reviewer with evidence of corrective action taken. If the appeal is granted, the denial, suspension, or revocation of IA certification is revised by the METS IA staff. Second-level appeals are processed similarly.

A person may apply for IA certification or recertification as deemed appropriate by the Chiefs of the Office of Flexible Pavement Materials and the Office of Construction Engineering.

2.5.2.2. Appeal Procedure for a Tester

A tester appeals by sending explanations and supporting documentation to the reviewer at the next highest level. Those levels of appeal are defined as (1) the District Materials Engineer in charge of the district IA Program, (2) the Deputy District Director of Construction, and (3) the Chiefs of the Office of Flexible Pavement Materials and the Office of Construction Engineering. The appellant must send the reviewer the appeal and supporting documentation within 14 calendar days from receiving notice of denial, suspension, or revocation. Upon receipt of an appeal, the district IA staff who denied, suspended, or revoked tester qualification prepares a memorandum or e-mail responding to the appeal and the tester's supporting documentation.

The appellant is notified of the decision on his/her appeal by e-mail for Caltrans employees or by certified mail for testers outside of Caltrans. Decisions are mailed within 14 calendar days from when the decision is made by the reviewer. If the appeal is denied, the notification letter will include the reason for the denial and information on the next-level appeal process that is available to the tester. If the tester decides to resolve the issue, the tester must provide the IA staff reviewer with evidence of corrective action taken. If the appeal is granted, the denial, suspension, or revocation of tester qualification is revised by the IA staff. Second- and third-level appeals are processed similarly.

A tester may reapply for qualification or requalification when deemed appropriate by the Chiefs of the Office of Flexible Pavement Materials and the Office of Construction Engineering.

2.5.2.3. Appeal Procedure for a Laboratory

A laboratory denied accreditation or reaccreditation in entirety or for specific test methods or whose accreditation has been revoked has the right of appeal. A laboratory representative makes an appeal by sending explanations and supporting documentation to the reviewer at the next highest level. Those levels of appeal are defined as (1) the District Materials Engineer in charge of the district IA Program, (2) the Deputy District Director of Construction, and (3) the Chiefs of the Office of Flexible Pavement Materials and the Office of Construction Engineering. The appellant sends the reviewer the appeal and supporting documentation within 14 calendar days from receiving notice of denial, suspension, or revocation. Upon receipt of an appeal, the district IA staff who denied, suspended, or revoked the laboratory accreditation prepares a memorandum or e-mail responding to the appeal and the laboratory's supporting documentation.

The appellant is notified of the decision on the appeal by e-mail or certified mail. Decisions are mailed within 14 calendar days from when the decision is made by the reviewer. If the appeal is denied, the notification letter will include the reason for the denial and information on the next-level appeal process that is available to the laboratory. If the laboratory decides to resolve the issue, the laboratory must provide the IA staff reviewer with evidence of corrective action taken. If the appeal is granted, the denial, suspension, or revocation of the laboratory's accreditation is revised by the IA staff. Second- and third-level appeals are processed similarly.

A laboratory that has had its accreditation revoked, or a laboratory that voluntarily withdraws its accreditation, will be required to reapply for accreditation as if it were a new laboratory and receive new on-site assessments.

2.5.3. Reporting Requirements for Dispute Resolution

District IA staff must summarize the district's denials, suspensions, revocations, appeals, and reinstatements annually for the year of December 1 of a given year through November 30 of the following year and submit the report to the METS IA Program Coordinator on or before December 15.

For decisions that deny, suspend, revoke, or reinstate qualification of testers and/or accreditation of laboratories, the district IA staff will notify Resident Engineers in their district and nearby districts, if the tester or laboratory may be used in those nearby districts.

The METS IA staff will summarize denials, suspensions, revocations, appeals, and reinstatements of IA certification annually for the year of December 1 of a given year through November 30 of the following year and submit the report to the METS IA Program Coordinator on or before December 15.

For decisions that deny, suspend, revoke, or reinstate IA certification, METS IA staff will notify the District Materials Engineer.

The METS IA Program Coordinator will summarize such information for inclusion in an annual report.

3. CUSTOMER FEEDBACK

METS IA Program staff would like feedback regarding this manual and any changes the customer deems necessary to make the IA Program more effective. Please contact:

Independent Assurance Program Coordinator METS
California Department of Transportation
Division of Engineering Services
Materials Engineering and Testing Services
TransLab, MS 5
5900 Folsom Boulevard, Room 227
Sacramento, CA 95819-4612
Telephone: (916) 227-7162

CALTRANS INDEPENDENT ASSURANCE (IA) CONTACTS

DISTRICT	NAME	FUNCTION	ADDRESS	TELEPHONE	FAX
TransLab	Roxanne Cargill	IA Program Coordinator	Caltrans TransLab, MS 5	916-227-7162	916-227-7052
	Liza Valencia	IA	5900 Folsom Blvd.	916-227-0384	916-227-7292
	Sam Kianfar	Calibration	Sacramento, CA 95819	916-227-7302	
	Steve Donnelly	Ref. Samples		916-227-7090	
	[Vacant]	Ref. Samples		916-227-7229	
1	Julian Barbash George Thorpe	IA	Caltrans District 01, IA 1656 Union St. Eureka, CA 95502	707-445-6374 707-445-6353	707-441-5764
2	Dennis Compomizzo Dan Curran Rene Robinett	IA	Caltrans District 02, IA 1657 Riverside Dr. Redding, CA 96049	530-225-3494 530-225-3194 530-225-3398	530-225-3165
3	Terry Stratford Del Courtney Cynthia Hicks	IA	Caltrans District 03, IA 703 B St. Marysville, CA 95901	530-741-4298 530-741-4355 916-624-2833	530-741-5401
4	Dennis Rohde Bernadette Graham Alex Sotoudehnik Steve Cox Victor Antido Ed Gamboa	IA	Caltrans District 04, IA 21339 Cabot Blvd. Hayward, CA 94545	Main Line 510-723-0174 510-723-0177 510-723-0176 510-723-0175 510-723-0181 510-723-0182 510-723-0178	510-723-0179
5	Steve Savage	IA	Caltrans District 05, IA 50 Higuera St. San Luis Obispo, CA 93401	805-549-3197	805-549-3300
6	Kirit Dave Jessa Dhaliwal	IA	Caltrans District 06, IA 1352 W. Olive Ave. Fresno, CA 93778	559-488-4113 559-488-4335	559-448-4160
7	Eric Collar Roberto Jarquin Robert Achuela Arnold Truong	IA	Caltrans District 07, IA 900 West Gladstone Ave. San Dimas, CA 91773-1734	909-305-1689 909-305-1689 909-305-1689	909-305-1699
8	Monte Hammer Terry Chapman David Farden	IA	Caltrans District 08, IA 720 E. Carnegie Drive, 240 San Bernardino, CA 92408	909-383-4619 909-383-4040 909-383-4619 909-383-4619	909-383-6335
9	William Schiller	IA	Caltrans District 09, IA 500 S. Main St. Bishop, CA 93514	760-872-0663	760-872-5239
10	Michael Antonetti	IA	Caltrans District 10, IA 1976 E. Charter Way Stockton, CA 95201	209-948-3980	209-948-7566
11	Jerry Hawley Roy (Chip) Denner	IA	Caltrans District 11, IA 7177 Opportunity Rd. San Diego, CA 92111	858-467-4067	858-467-4063
12	John Warrick Ashley Shaw Farhad Hajibabie	IA	Caltrans District 12, IA 19601 Beach Blvd., Bldg. I Huntington Beach, CA 92648	714-374-7853 714-374-7863 949-724-2129	714-374-7604

WEBSITES RELATED TO THE CALTRANS INDEPENDENT ASSURANCE PROGRAM

Caltrans Independent Assurance

<<http://www.dot.ca.gov/hq/esc/TransLab/>>

Caltrans Construction Manual

<<http://www.dot.ca.gov/hq/construc/manual2001/>>

Code of Federal Regulations

Title 23—Highways

Chapter I—Federal Highway Administration, Department of Transportation

Part 637—Construction Inspection and Approval

<http://www.access.gpo.gov/nara/cfr/waisidx_01/23cfr637_01.html>

California Test (CT) Methods

<<http://www.dot.ca.gov/hq/esc/ctms/>>

AASHTO Test Methods

<<https://www.transportation.org/publications/bookstore.nsf/Home?OpenForm>>

ASTM Test Methods

<<http://www.astm.org/cgi-bin/SoftCart.exe/index.shtml?E+mystore>>

AASHTO Materials Reference Laboratory (AMRL)

<<http://www.amrl.net/Portal/DesktopDefault.aspx?tabindex=0&tabid=1>>

GLOSSARY AND ACRONYMS

AASHTO American Association of State Highway and Transportation Officials.

Acceptance The formal written acceptance by the Director of the California Department of Transportation (Caltrans) of an entire contract that has been completed in all respects in accordance with the plans and specifications and any modifications thereof previously approved.

Acceptance Program All factors that comprise the state highway agency's (SHA's) 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 Caltrans IA Program applies to testing performed within the confines of the laboratory accredited and testing performed in the field (on-site). Temporary facilities, including trailers or other structures set up for a specific job and the personnel and equipment associated with them, require separate accreditation.

AMRL AASHTO Materials Reference Laboratory.

ANSI American National Standards Institute.

ASTM American Society of Testing and Materials.

Calibration The set of operations that establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, and the corresponding standard or known values derived from the standard (AMRL).

Calibration Certificate or Report Document that presents calibration results and other information relevant to a calibration (AMRL).

Calibration Interval Period of time or amount of use between calibrations required to ensure measuring and test equipment remains within tolerance for intended use.

Calibration Method Defined technical procedure for performing a calibration or verification.

Caltrans Project Any construction project on the existing or future state highway system. Project can be administered by Caltrans or a local agency.

Certified IA Staff Caltrans staff certified to qualify the testers and accredit the laboratories according to the procedures listed in this *Independent Assurance Manual*.

Contract The written agreement covering the performance of the work and the furnishing of labor, materials, tools, and equipment in the construction of the work. The contract shall include the notice to contractors, proposal, plans, specifications, special provisions, and contract bonds; also any and all supplemental agreements amending or extending the work contemplated and

which may be required to complete the work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments, or extensions to the contract and include contract change orders.

Contractor The person or persons, firm, partnership, corporation, or combination thereof, private or municipal, who have entered into a contract with Caltrans, as party or parties of the second part of their legal representatives.

CT Method or CTM California Test Method.

Denial The action taken when district staff requesting IA certification, a tester requesting qualification, or a laboratory requesting accreditation is denied certification, qualification, or accreditation (as appropriate) for failure to meet the requirements for initial certification, qualification, or accreditation, or for recertification, requalification, or reaccreditation.

Dispute Resolution The process of denial, suspension, revocation, appeals, and reinstatement for IA staff certification, tester qualification, or laboratory accreditation.

FHWA Federal Highway Administration.

IA Independent Assurance.

IA Samples and Tests Activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program. Test procedures used in the acceptance program that are performed in the SHA's central laboratory would not be covered by an IA Program. (23 CFR 637B)

Influence Quantity A quantity that is not the subject of the measurement but which influences the value of the measurand or the indication of the measuring instrument. Examples: ambient temperature/pressure/humidity; frequency of an alternating measured voltage.

Laboratories Laboratories that are capable as defined by this program. As a minimum, a laboratory shall include calibrated test equipment and the laboratory shall keep records of calibration checks. Temporary facilities, including trailers or other structures set up for a specific job, shall be considered a laboratory and shall require accreditation.

Local Agency Roadway Project Projects administered by a local agency that are not on the designated National Highway System (NHS).

Measurand A quantity subjected to measurement.

Measurement The set of operations having the object of determining the value of a measurand.

Measurement Standard A material measure, measuring instrument, reference material, or system intended to define or realize a unit or one or more known values of a quantity to serve as a reference.

Measuring and Test Equipment All of the measuring instruments, measurement standards, reference materials, and auxiliary apparatus that are necessary to perform a measurement.

METS Materials Engineering and Testing Services, a subdivision of the Caltrans Division of Engineering Services.

National Highway System (NHS) The NHS shall consist of interconnected urban and rural principal arterials and highways (including toll facilities) that serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. All routes on the Interstate system are a part of the NHS.

National (Measurement) Standard A standard recognized by an official national decision to serve, in a country, as the basis for fixing the value of all other standards of the quantity concerned.

NCSI National Computational Science Institute.

NCSL National Conference of Standards Laboratories.

NHS Project Federally funded project on the NHS. Project can be administered by Caltrans or a local agency.

NIST National Institute of Standards and Technology.

Proficiency Samples Homogeneous samples that are distributed and tested by two or more laboratories. The test results are compared to ensure that the laboratories are obtaining the same results. (23 CFR 637B)

Proficiency Testing through the Caltrans IA Program (three-fold):

Proficiency Testing With Reference Samples is managed by METS IA staff in Headquarters. Samples are manufactured and distributed, and results are analyzed and reported by METS.

Corroboration Samples are distributed and results are analyzed and reported by district IA staff.

Witnessing of testing is performed in the districts by district IA staff and at the TransLab by METS IA staff.

Qualified Sampling and Testing Personnel Personnel who are capable as defined by appropriate programs established by each SHA. (23 CFR 637B)

Qualified Tester At the project level, the Caltrans quality assurance process requires that only qualified testers and accredited laboratories provide test results on which acceptance decisions are based. A tester becomes qualified by successfully following the process presented in this *Independent Assurance Manual*.

Quality Assurance All those planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality. (23 CFR 637B)

Quality Control All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements. (23 CFR 637B)

Random Sample A sample drawn from a lot in which each increment in the lot has an equal probability of being chosen. (23 CFR 637B).

Revocation The action taken when IA certification, tester qualification, or laboratory accreditation is withdrawn for an extended period of time due to failure to meet the requirements of the Caltrans IA Program. In most cases this condition is due to major problems by the individual or laboratory involved or the deficiencies are too major and/or numerous to be corrected in a reasonable time. Revocation may also occur if the IA staff, tester, or laboratory acts in such a manner as to bring Caltrans into disrepute or makes any statements relative to its certification, qualification, or accreditation that Caltrans considers false or misleading. Revocation is not necessarily tied to the review process and may occur at any time for cause. A tester or laboratory may have its entire qualification or accreditation or its qualification or accreditation for specific test methods revoked if it is found not to conform to IA accreditation requirements.

SHA State Highway Agency

Suspension The action taken when IA certification, tester qualification, or laboratory accreditation is temporarily suspended due to failure to meet the requirements of the Caltrans IA Program. In most cases this condition is temporary due to equipment damage or problems, loss of key personnel, change in laboratory location, failure to pay fees, or failure to resolve deficiencies related to the requirements of the Caltrans IA Program. Suspension is not necessarily tied to the review process and may occur at any time for cause. A tester or laboratory may have its entire qualification or accreditation or its qualification or accreditation for specific test methods suspended if it is found not to conform to IA accreditation requirements.

Tolerance of a Measuring Instrument The extreme values of an error permitted by specifications, regulations, etc., for a given measuring instrument.

Traceability The property of a result of a measurement whereby it can be related to appropriate standards, generally national or international standards, through an unbroken chain of comparisons.

TransLab Caltrans Headquarters laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819. Includes METS and Geotechnical Services, subdivisions of the Division of Engineering Services.

Vendor A supplier of project-produced material that is not the contractor. (23 CFR 637B)

Verification A process that establishes whether the results of a previously calibrated measurement instrument, measurement system, or material measure are stable (AMRL).

Verification Sampling and Testing Sampling and testing performed to validate the quality of a product. (23 CFR 637B)

(To) Witness To observe and evaluate a tester performing a given test method.

*Code of Federal Regulations***TITLE 23—HIGHWAYS****CHAPTER I—FEDERAL HIGHWAY ADMINISTRATION, DEPARTMENT OF
TRANSPORTATION****PART 637—CONSTRUCTION
INSPECTION AND APPROVAL****Subpart A [Reserved]****Subpart B—Quality Assurance
Procedures for Construction**

Sec.

637.201 Purpose.

637.203 Definitions.

637.205 Policy.

637.207 Quality assurance program.

637.209 Laboratory and sampling and
testing personnel qualifications.

Appendix A to Subpart B of Part 637—
Guide Letter of Certification by State
Engineer

Authority: Sec. 1307, Pub. L. 105-178, 112
Stat. 107; 23 U.S.C. 109, 114, and 315;
49 CFR 1.48(b).

Source: 60 FR 33717, June 29, 1995, unless
otherwise noted.

Editorial Note: Nomenclature changes to
part 637 appear at 67 FR 75934,
Dec. 10, 2002.

Subpart A [Reserved]**Subpart B—Quality Assurance
Procedures for Construction****§ 637.201 Purpose.**

To prescribe policies, procedures, and
guidelines to assure the quality of materials
and construction in all Federal-aid highway
projects on the National Highway System.

§ 637.203 Definitions.

Acceptance program. All factors that
comprise the State transportation
department's (STD) 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.

Independent assurance program.
Activities that are an unbiased and
independent evaluation of all the sampling
and testing procedures used in the
acceptance program. Test procedures used in
the acceptance program which are
performed in the STD's central laboratory
would not be covered by an independent
assurance program.

Proficiency samples. Homogeneous
samples that are distributed and tested by
two or more laboratories. The test results are
compared to assure that the laboratories are
obtaining the same results.

Qualified laboratories. Laboratories that
are capable as defined by appropriate
programs established by each STD. As a
minimum, the qualification program shall
include provisions for checking test
equipment and the laboratory shall keep
records of calibration checks.

Qualified sampling and testing
personnel. Personnel who are capable as
defined by appropriate programs established
by each STD.

Quality assurance. All those planned and
systematic actions necessary to provide

confidence that a product or service will satisfy given requirements for quality.

Quality control. All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

Random sample. A sample drawn from a lot in which each increment in the lot has an equal probability of being chosen.

Vendor. A supplier of project-produced material that is not the contractor.

Verification sampling and testing. Sampling and testing performed to validate the quality of the product.

§ 637.205 Policy.

- (a) Quality assurance program. Each STD shall develop a quality assurance program which will assure that the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS are in conformity with the requirements of the approved plans and specifications, including approved changes. The program must meet the criteria in § 637.207 and be approved by the FHWA.
- (b) STD capabilities. The STD shall maintain an adequate, qualified staff to administer its quality assurance program. The State shall also maintain a central laboratory. The State's central laboratory shall meet the requirements in § 637.209(a)(2).
- (c) Independent assurance program. Independent assurance samples and tests or other procedures shall be performed by qualified sampling and testing personnel employed by the STD or its designated agent.
- (d) Verification sampling and testing. The verification sampling and testing are to be performed by qualified testing

personnel employed by the STD or its designated agent, excluding the contractor and vendor.

- (e) Random samples. All samples used for quality control and verification sampling and testing shall be random samples.

§ 637.207 Quality assurance program.

- (a) Each STD's quality assurance program shall provide for an acceptance program and an independent assurance (IA) program consisting of the following:
 - (1) Acceptance program.
 - (i) Each STD's acceptance program shall consist of the following:
 - (A) Frequency guide schedules for verification sampling and testing which will give general guidance to personnel responsible for the program and allow adaptation to specific project conditions and needs.
 - (B) Identification of the specific location in the construction or production operation at which verification sampling and testing is to be accomplished.
 - (C) Identification of the specific attributes to be inspected which reflect the quality of the finished product.
 - (ii) Quality control sampling and testing results may be used as part of the acceptance decision provided that:
 - (A) The sampling and testing has been performed by qualified laboratories and qualified sampling and testing personnel.
 - (B) The quality of the material has been validated by the

- verification sampling and testing. The verification testing shall be performed on samples that are taken independently of the quality control samples.
- (C) The quality control sampling and testing is evaluated by an IA program.
- (iii) If the results from the quality control sampling and testing are used in the acceptance program, the STD shall establish a dispute resolution system. The dispute resolution system shall address the resolution of discrepancies occurring between the verification sampling and testing and the quality control sampling and testing. The dispute resolution system may be administered entirely within the STD.
- (iv) In the case of a design-build project on the National Highway System, warranties may be used where appropriate. See 23 CFR 635.413(e) for specific requirements.
- (2) The IA program shall evaluate the qualified sampling and testing personnel and the testing equipment. The program shall cover sampling procedures, testing procedures, and testing equipment. Each IA program shall include a schedule of frequency for IA evaluation. The schedule may be established based on either a project basis or a system basis. The frequency can be based on either a unit of production or on a unit of time.
- (i) The testing equipment shall be evaluated by using one or more of the following: Calibration checks, split samples, or proficiency samples.
- (ii) Testing personnel shall be evaluated by observations and split samples or proficiency samples.
- (iii) A prompt comparison and documentation shall be made of test results obtained by the tester being evaluated and the IA tester. The STD shall develop guidelines including tolerance limits for the comparison of test results.
- (iv) If the STD uses the system approach to the IA program, the STD shall provide an annual report to the FHWA summarizing the results of the IA program.
- (3) The preparation of a materials certification, conforming in substance to Appendix A of this subpart, shall be submitted to the FHWA division administrator for each construction project which is subject to FHWA construction oversight activities.
- (b) In the case of a design-build project funded under title 23, U.S. Code, the STD's quality assurance program should consider the specific contractual needs of the design-build project. All provisions of paragraph (a) of this section are applicable to design-build projects. In addition, the quality assurance program may include the following:
- (1) Reliance on a combination of contractual provisions and acceptance methods;
- (2) Reliance on quality control sampling and testing as part of the acceptance decision, provided that adequate verification of the design-builder's

quality control sampling and testing is performed to ensure that the design-builder is providing the quality of materials and construction required by the contract documents.

- (3) Contractual provisions which require the operation of the completed facility for a specific time period.

[60 FR 33717, June 29, 1995, as amended at
67 FR 75934, Dec. 10, 2002]

§ 637.209 Laboratory and sampling and testing personnel qualifications.

(a) Laboratories.

- (1) After June 29, 2000, all contractor, vendor, and STD testing used in the acceptance decision shall be performed by qualified laboratories.
- (2) After June 30, 1997, each STD shall have its central laboratory accredited by the AASHTO Accreditation Program or a comparable laboratory accreditation program approved by the FHWA.
- (3) After June 29, 2000, any non-STD designated laboratory which performs IA sampling and testing shall be accredited in the testing to be performed by the AASHTO Accreditation Program or a comparable laboratory accreditation program approved by the FHWA.
- (4) After June 29, 2000, any non-STD laboratory that is used in dispute resolution sampling and testing shall be accredited in the testing to be performed by the AASHTO Accreditation Program or a comparable laboratory accreditation program approved by the FHWA.

(b) Sampling and testing personnel. After June 29, 2000, all sampling and testing data to be used in the acceptance decision or the IA program shall be executed by qualified sampling and testing personnel.

(c) Conflict of interest. In order to avoid an appearance of a conflict of interest, any qualified non-STD laboratory shall perform only one of the following types of testing on the same project: Verification testing, quality control testing, IA testing, or dispute resolution testing.

APPENDIX A TO SUBPART B OF PART 637—GUIDE LETTER OF CERTIFICATION BY STATE ENGINEER

Date _____

Project No. _____

This is to certify that:

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications. (The following sentence should be added if the IA testing frequencies are based on project quantities. All independent assurance samples and tests are within tolerance limits of the samples and tests that are used in the acceptance program.)

Exceptions to the plans and specifications are explained on the back hereof (or on attached sheet).

Director of STD Laboratory or other appropriate STD Official.

WAIS Document Retrieval [Code of Federal Regulations]
[Title 23, Volume 1]
[Revised as of April 1, 2003]
From the U.S. Government Printing Office via GPO Access
[CITE: 23CFR637]

TYPICAL DESCRIPTION OF TESTER'S TRAINING PROGRAM**STAFF TRAINING PROGRAM FOR TESTING TECHNICIANS**

The [insert position here] is responsible for the training program and maintenance of all training records. Copies of the results of all training shall be distributed to the (Position) and copies of the results of training and competency evaluations shall be distributed as necessary to: [qualifying agencies and others as necessary]

Competency evaluation records shall be retained as detailed in the Laboratory Quality Manual.

All materials technicians shall be trained and that training documented, prior to performing test procedures. The following training procedures shall be followed for each test:

1. The trainee shall obtain a copy (latest revision) of the applicable California Test (CT) and/or AASHTO test and/or ASTM test procedure and report form(s).
2. The trainee shall study the test procedure and test report forms to become familiar with the equipment, terminology, test procedure, calculations, and test reports.
3. A qualified technician shall demonstrate the test procedure, calculations, and associated paperwork for the trainee.
4. The trainee shall repeatedly perform the test procedure, calculations, and associated paperwork under the guidance of a qualified technician until proficiency is obtained.
5. The laboratory supervisor shall observe the trainee demonstrating the procedure and document that the trainee has demonstrated the ability to perform the test procedure, calculations, and associated paperwork, by making an entry in the trainee's training record. Testers requiring additional training will be documented.

CALTRANS LABORATORY ACCREDITATION MANUAL**1. Contacts**

Laboratory name, address, telephone number, and fax number.

2. Organizational Chart

Laboratory organizational chart (complete and up-to-date).

3. Quality Control Manager

Laboratory Quality Control Manager qualifications.

4. Laboratory Affiliations

Laboratory accreditations/certifications/qualifications (private, city, county, state, federal).

5. Reference Sample Records

Proof of current and past successful participation in proficiency testing with reference samples.

6. List of Test Procedures

List of test procedures (accreditation will be limited to relevant tests).

7. Calibration

Testing equipment calibration, service and inventory list:

- All test equipment calibration, maintenance, and service will be documented. All calibration devices will be traceable to the National Institute of Standards and Technology (NIST).
- Calibration, maintenance, and service will be in accordance with accepted standards, manufacturer's recommendations, and applicable test procedures; intervals will not exceed one year.
- All test equipment will have a calibration decal attached. The calibration decal will have the information specified in the calibration portion of this manual.
- Equipment inventory list will include the following information: equipment name, make, model, serial or ID number, calibration date, next calibration due date, the calibrator, and acceptable tolerances. Form TL-0112, "Inventory of Materials Testing Equipment," can be used for this purpose.

8. Personnel

List of personnel to be qualified for testing including:

- Materials-related work experience summaries.
- Copies of current certifications/qualifications (ACI, NICET, NRMCA, Caltrans, etc.).
- Detailed summary of training, including comprehensive description of the training, total hours of training, and training dates.

9. Nuclear Gage

- Nuclear gage license (if applicable).
- Nuclear moisture/density gages will have current calibration.

GUIDELINES FOR THE CALIBRATION VERIFICATION OF KNEADING COMPACTORS USED TO PERFORM CALIFORNIA TEST METHODS 101 AND 104

By Sam Kianfar, Caltrans IA Calibration Specialist

A. SCOPE

This procedure is intended to be a supplemental guideline to be used in conjunction with CT 101, “Operation and Calibration of the Mechanical Compactor,” and CT 104, “Operation and Calibration of the Electronically Controlled Compactor.” It is intended to help resolve deficiencies in and discrepancies between the test methods. It identifies the basic requirements, that must be met by all compactors regardless of make or model, in order to be used on Caltrans projects. It also defines the responsibilities of the lab and of the verification service.

It is the responsibility of the lab requesting calibration to provide the following:

- Before the service technician gets to the lab, the equipment should be cleaned and the area around the equipment should be cleared so the service technician has complete access to the equipment being verified. Any annual maintenance recommended by the manufacturer should be done and documented within one month prior to the verification of the equipment.
- The lab should supply a testing technician that is familiar and competent with the operation of the equipment being verified to assist the service technician as needed. The testing technician should know how to make any adjustments needed to bring the compactor into calibration.

Limitations

- This guideline is limited to only the verification that the kneading compactor meets the standards set forth in CT 101 and CT 104.
- It does not address procedures to adjust or calibrate the compactor.
- It must be recognized by the lab that the compactor is only one of the many different items of equipment that is used in the California Test methods and that each of these items of equipment need to be verified on a regular basis. This verification can be done by an in-house program or by an outside service or a combination of these options. There should be records of equipment verification on file in the lab.

B. APPARATUS

1. Kneading compactor and accessories
2. A load-indicating device and recorder capable of measuring and graphing loads up to 8900 N (2000 lbf) to the nearest 50 N (10 lbf) vs. time to the nearest .05 seconds
3. A 100 +/- 2 mm diameter rubber disc 3 +/- 0.5 mm thick with a minimum diameter value of 80
4. A steel plate 127 +/- 2 mm by 152 +/- 2 mm by 13 +/- 2 mm thick with a 63.5 +/- 0.5 mm diameter by 9.5 +/- 0.5 mm deep recess cut in the center of the plate
5. A set of feeler gages
6. Assorted tools

Verification Procedure**1. General Condition of the Equipment**

There should not be any unsafe conditions related to the operation of the equipment.

- a. It is the lab's responsibility to maintain the equipment in good working condition.
- b. The equipment should be kept clean and clear of clutter.
- c. The compactor should not leak excessive amounts of oil.
- d. The equipment should have routine maintenance performed on it (according to the manufacturer's recommendation).
- e. A record of equipment maintenance should be posted on or near the equipment.
- f. The compactor foot should be sharp—a dull foot should be replaced.
- g. The foot heater should heat the foot to a temperature that will keep mix from sticking to it.
- h. If the mold holder is used for CT 304, "Preparation of Bituminous Mixtures for Testing," it may not have a rubber pad permanently attached to it.
- i. Measure the mold to foot clearance with a feeler gage and report it in Table 2.
- j. Count the number of tamps per rotation and report it in Table 2.

Document the condition of the equipment in Tables 1 and 2 below.

TABLE 1. VISUAL OBSERVATIONS

ANY UNSAFE CONDITIONS	NONE	DIRTY	UNACCEPTABLE
Appearance	Clean	Dirty	Unacceptable
Oil Leaks	None	Slight	Unacceptable
Maintenance Records	Good	Poor	Unacceptable
Compactor Foot	Sharp	Dull	Unacceptable
Foot Heater	Good	Poor	Unacceptable
Mold Holder (No Pad)	Good		Unacceptable
Any Unsafe Conditions	None		Unacceptable

Comments: _____

TABLE 2. MEASURED OBSERVATIONS

Mold to Foot Clearance	Approximately 1.6 mm
Table Rotation	5-7 Tamps per Rotation

Any unacceptable condition should be corrected before continuing with this procedure.

NOTE: In addition to the requirements listed above, it is also recommended that for the mechanical compactor these additional items listed in Table 3 are checked.

TABLE 3.

Guide Bar to Box Clearance	Limits = 0.002" to 0.004"
Foot to Rail Clearance	Limits = 0.004" to 0.006"

The items are not part of the basic requirements. However, if this is outside the limits it could effect the continual operation of the compactor. The lab should consult with an experienced service technician.

2. Load vs. Time Verification

NOTE: For the mechanical compactor it is recommended that the bypass valve be adjusted according to Section E., items 1–4. of CT 101 before continuing with this procedure.

- a. Prior to verifying the load vs. time requirements, warm up the compactor and the verification equipment for at least 30 minutes.
- b. Stop the turntable rotation.
- c. Place the steel plate and the rubber disc on the turntable.
- d. Place the load cell on the rubber disc centered under the foot.
- e. Start the compactor and the load recording equipment; adjust the foot pressure to the pressure level being verified.
- f. Allow the compactor to run through several cycles; this is to let the compactor and the load indicating equipment to stabilize.
- g. Most compactors are verified at both 2.41 MPa (350 psi) and 3.45 MPa (500 psi). If this is the case, verify the lower pressure first.
- h. Once the equipment is ready, adjust the foot pressure so the peak pressure is at the pressure being verified (either 2.41 MPa [350 psi] or 3.45 MPa [500 psi]).
- i. Record at least two consecutive cycles on the load vs. time trace.
- j. A copy of this trace must be included in the report.
- k. From the load time trace, verify that the following load time requirements are met.

TABLE 4.

Load Rise Time 2.41 MPa (350 psi)	From 0.24 MPa (35 psi) to 2.07 MPa (300 psi). Not less than 0.07 sec. Not greater than 0.20 sec.
Load Rise Time 3.45 MPa (500 psi)	From 0.34 MPa (50 psi) to 2.93 MPa (425 psi). Not less than 0.07 sec. Not greater than 0.25 sec.
Dwell Time 2.41 MPa (350 psi)	Not less than 0.15 sec. or more than 0.45 sec. At a foot pressure of 2.07 MPa (300 psi) or more.
Dwell Time 3.45 MPa (500 psi)	Not less than 0.15 sec. or more than 0.45 sec. At a foot pressure of 2.93 MPa (425 psi) or more.
Pressure Release Time	Shall not be greater than 0.60 sec.
Tamp Time Interval	The time from the start of one cycle to the start of the next cycle shall be 2.0 seconds.

If any of these requirements are not met, the compactor must be adjusted to bring it into calibration and the above procedure must be repeated until all requirements are met.

If all the above requirements are met:

- Adjust the foot pressure as indicated by the load–indicating equipment to the pressures that the compactor will use during normal operation (i.e., 1.72 MPa [250 psi], 2.41 MPa [350 psi], and 3.45 MPa [500 psi]).
- Observe the readings on the compactor gage. If the gage readings differ from the load–indicating equipment, adjust the gage to match the load cell or record the gage readings in the report and post a sign on the compactor that indicates the gage readings that correspond to the pressures needed.
- Compactors that are equipped with a signal light mechanism should have this device checked and adjusted as described in Section E. item 5. of CT 101.
- The electronically controlled compactors have several controls that are used to adjust the calibration. Once the compactor is verified, these controls should be locked in place so they cannot be inadvertently changed by the operator. The settings of these controls shall be noted in the report and posted on the equipment.
- If the setting of these controls differ from those noted in the report, the compactor is out of calibration.

NOTE: In order for some of the electronically controlled compactors to meet the load time requirement, the controls must be set to a different setting for the high pressure than for the low pressure. If this is the case, note the proper settings for each pressure in the report and post them on the compactor. Also explain the settings to the lab manager.

The compactor is in calibration only if the controls are at the correct settings for the pressure being used.

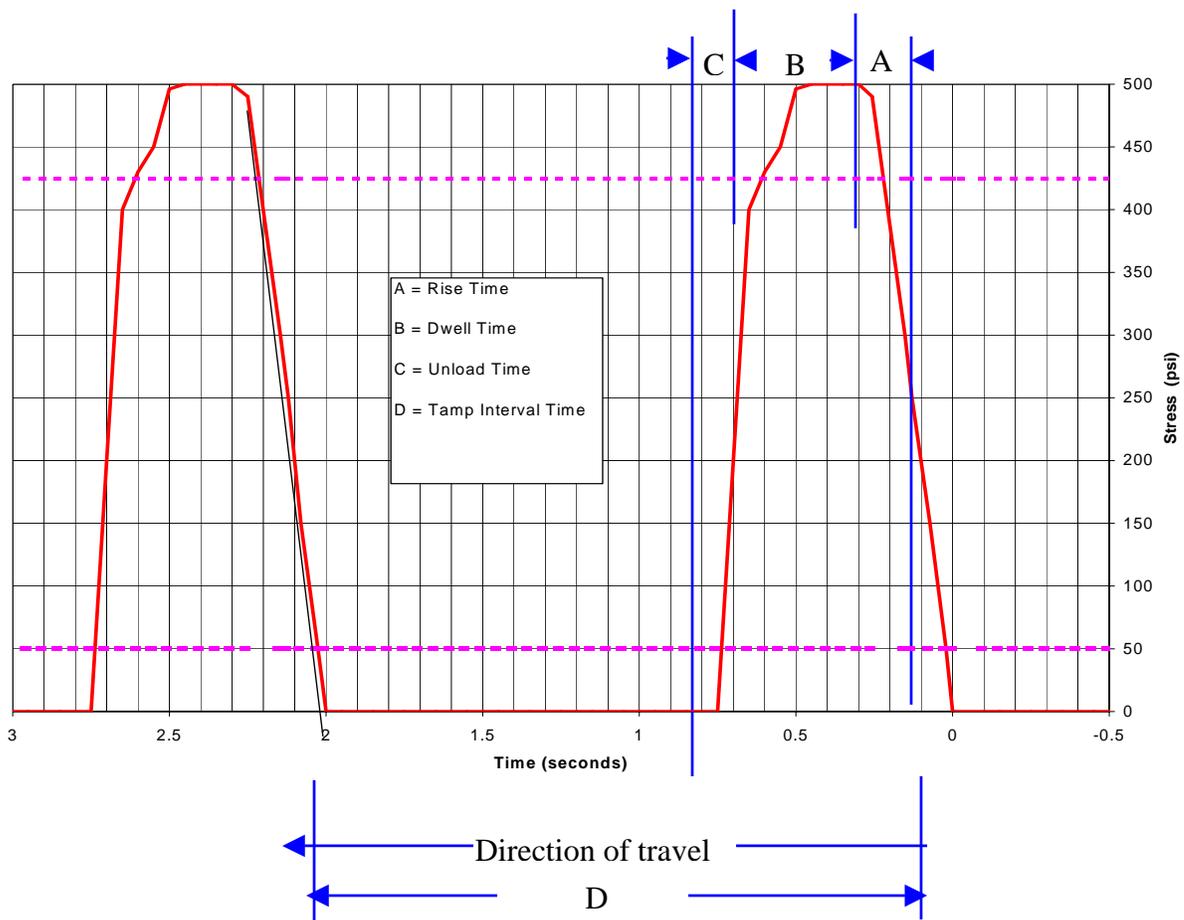
C. REPORT

The verification service must provide a report that includes the following:

1. The date of verification.
2. The name and address of the lab being verified.
3. The name and signature of the laboratory manager.
4. The date that the next verification is due.
5. A description of the equipment being verified (this should include make, model, and serial number).
6. A description of the verification equipment used (this should include make, model, serial number, and traceability to NIST). Attach a copy of certificates of traceability to NIST.

7. The name and address of the verification company.
8. The name and signature of the technician providing the service.
9. The results of the check of the items listed in Table 5 must be reported (no unacceptable conditions are allowed).
10. The requirements in Tables 7 and 8 must be measured and the result must be included in the report (all these must meet stated specifications).
11. A copy of the load time traces. This must include an explanation of the scales. The X-axis shall represent time (seconds) and the Y-axis shall represent load (N, Kg, lbf) or stress (MPa, psi). The explanation must state the units used, conversion factors, and direction of travel of the graph.
12. Any adjustment that has been made should be noted in the comments section.
13. Record the setting of any controls used to adjust the calibration.
14. Any special instructions needed to operate the compactor properly.

Example of Load Time Requirements



Explanation:

	X-Axis	Y-Axis
Unit	seconds	psi
Conversion	NA	NA

Kneading Compactor Verification Report

TABLE 5. VISUAL OBSERVATIONS

ANY UNSAFE CONDITIONS	NONE	DIRTY	UNACCEPTABLE
Appearance	Clean	Dirty	Unacceptable
Oil Leaks	None	Slight	Unacceptable
Maintenance Records	Good	Poor	Unacceptable
Compactor Foot	Sharp	Dull	Unacceptable
Foot Heater	Good	Poor	Unacceptable
Mold Holder (No Pad)	Good		Unacceptable
Any Unsafe Conditions	None		Unacceptable

Comments:

TABLE 6. MEASURED OBSERVATIONS

Mold to Foot Clearance	Approximately 1.6 mm
Table Rotation	5–7 Tamps per Rotation

TABLE 7.

Load Rise Time 2.41 MPa (350 psi)	From 0.24 MPa (35 psi) to 2.07 MPa (300 psi). Not less than 0.07 sec. Not greater than 0.20 sec.
Load Rise Time 3.45 MPa (500 psi)	From 0.34 MPa (50 psi) to 2.93 MPa (425 psi). Not less than 0.07 sec. Not greater than 0.25 sec.
Dwell Time 2.41 MPa (350 psi)	Not less than 0.15 sec. or more than 0.45 sec. At a foot pressure of 2.07 MPa (300 psi) or more.
Dwell Time 3.45 MPa (500 psi)	Not less than 0.15 sec. or more than 0.45 sec. At a foot pressure of 2.93 MPa (425 psi) or more.
Pressure Release Time	Shall not be greater than 0.60 sec.
Tamp time Interval	The time from the start of one cycle to the start of the next cycle shall be 2.0 seconds.

TABLE 8. COMPACTOR SETTINGS

GAGE SETTINGS	TO GET	SET TO
	250 psi	
	350 psi	
	500 psi	
SPRING DEVICE	350 psi	
	500 psi	

Kneading Compactor Verification Report

Laboratory Name: _____

Laboratory Address: _____

Personnel Roster

Materials Engineer: _____

Laboratory Supervisor: _____

Testing Technicians: _____

Next Certification Due Date (Month/Year): _____

Equipment Verified

Make: _____ Model: _____ Serial #: _____

Date first put in service: _____

Comments: _____

Verification Devices

VERIFICATION DEVICE	SERIAL #	DESCRIPTION	CALIBRATION DATE

Verification service provided by:

Company Name: _____

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I certify that to the best of my knowledge the information contained in this report is true and correct.

Service Technician: _____

Witnessed by: _____

CALTRANS STANDARD RECOMMENDED PRACTICE FOR THE CALIBRATION OF MATERIALS TESTING EQUIPMENT

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1. SCOPE

This document contains criteria and guidelines for the calibration of materials testing equipment used by construction materials laboratories (CML).

2. TERMINOLOGY

- 2.1 Calibration:** The set of operations that establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, and the corresponding standard or known values derived from the standard.
- 2.2 Calibration Certificate or Report:** Document that presents calibration results and other information relevant to a calibration.
- 2.3 Calibration Interval:** Period of time or amount of use between calibrations required to ensure measuring and test equipment remain within tolerance for intended use.
- 2.4 Calibration Method:** Defined technical procedure for performing a calibration or verification.
- 2.5 Influence Quantity:** A quantity that is not the subject of the measurement but which influences the value of the measurand or the indication of the measuring instrument.
EXAMPLES: Ambient temperature/pressure/humidity; frequency of an alternating measured voltage.
- 2.6 Measurand:** A quantity subjected to measurement.
- 2.7 Measurement:** The set of operations having the object of determining the value of a measurand.
- 2.8 Measurement Standard:** A material measure, measuring instrument, reference material, or system intended to define or realize a unit or one or more known values of a quantity to serve as a reference.
- 2.9 Measuring and Test Equipment:** All of the measuring instruments, measurement standards, reference materials, and auxiliary apparatus that are necessary to perform a measurement.

- 2.10 National (Measurement) Standard:** A standard recognized by an official national decision to serve, in a country, as the basis for fixing the value of all other standards of the quantity concerned.
- 2.11 Tolerance of a Measuring Instrument:** The extreme values of an error permitted by specifications, regulations, etc., for a given measuring instrument.
- 2.12 Traceability:** The property of a result of a measurement whereby it can be related to appropriate standards, generally national or international standards, through an unbroken chain of comparisons.
- 2.13 Uncertainty of Measurement:** Parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand.
- 2.14 Verification:** Evidence by calibration that specified requirements have been met.

NOTE:

- 2.14 (1) The result of verification leads to a decision either to restore to service, to perform adjustments, or to repair, downgrade, or declare obsolete. In all cases, documentation of the verification performed is kept in the measuring instrument's individual record.
- 2.14 (2) The term "verification" is frequently referred to as a "calibration" in the United States.

3. QUALITY SYSTEM CRITERIA

- 3.1 Caltrans Independent Assurance (IA):** The **IA Program Coordinator** shall assign a certified IA individual who has overall responsibility for the calibration of measuring and test equipment. In addition, the **IA Program Coordinator** shall nominate someone to serve in the IA individual's absence.
- 3.2 Equipment Calibration and Verification:** The CML shall calibrate or verify all testing equipment or APPARATUS associated with tests that the CML performs per specifications in the California Test Method (CTM), American Association of State Highway and Transportation Officials (AASHTO), or American Society of Testing and Materials (ASTM) procedure. Some of the equipment that have specified tolerances in the CTM/AASHTO/ASTM procedures and require calibration/verification are:
- 3.2 (1) Balances/Scales
- 3.2 (2) Ovens
- 3.2 (3) Thermometers
- 3.2 (4) Sieves
- 3.2 (5) Timers
- 3.2 (6) Compression Testing Machines
- 3.2 (7) Nuclear Density/Moisture Meters
- 3.2 (8) Weights/Masses (e.g., abrasive charges for the LA Rattler)
- 3.2 (9) Unit Weight Measures
- 3.2 (10) California Impact Test Apparatus

- 3.2 (11) LA Rattlers
- 3.2 (12) Air Content Meters
- 3.2 (13) Concrete Curing Tanks
- 3.2 (14) Molds

3.3 Calibration Intervals: Intervals for materials testing equipment shall be no greater than **12 months**—or as specified in the CTM/AASHTO/ASTM procedure. Newly acquired equipment without a manufacturers calibration or verification report shall be calibrated or verified before being placed into service.

NOTE: *If the materials testing equipment does not remain within tolerance during the calibration interval, the testing equipment needs to be either repaired or replaced so that it will remain within tolerance.*

3.4 Calibration Methods: The CML shall have detailed written procedures for all in-house calibration and verification activities. **(See Attachment A for samples of acceptable local calibration/verification procedures and reports.)** The local calibration or verification procedure shall include:

- 3.4 (1) A description of the equipment to be calibrated or verified including the parameter range and tolerance (e.g., manufacturer’s accuracy specification, CTM requirement).
- 3.4 (2) A description of the reference standard(s) required, including parameter(s) range(s) and tolerances or uncertainties. **The reference standards used shall be traceable to the National Institute of Standards and Technology (NIST).**
- 3.4 (3) A step-by-step procedure to perform the calibration or verification.
- 3.4 (4) A report with detailed results of the work performed according to the procedure.

3.5 Calibration Reports: The local calibration or verification report shall include:

- 3.5 (1) Title (e.g., “Calibration Report” or “Calibration Certificate”).
- 3.5 (2) Location where the calibration was performed.
- 3.5 (3) Unique identification of the certificate or report and of each page, and the total number of pages.
- 3.5 (4) Identification of the test equipment calibrated or verified—including serial number or Caltrans number and manufacturer make, model, range, and accuracy; notes on the condition of the calibration item.
- 3.5 (5) The date the calibration is done.
- 3.5 (6) A signature and title of the individual performing the work.
- 3.5 (7) Identification of the calibration or verification procedure used.
- 3.5 (8) The previous calibration or verification date and the next calibration or verification due date of the test equipment.
- 3.5 (9) Notes on any deviation from, addition to, or exclusions from the calibration method, and any other information relevant to the calibration, such as environmental conditions.
- 3.5 (10) Any special limitations of use.
- 3.5 (11) Identification of the NIST traceable, reference standard(s) used, including serial numbers, calibration date, and other information to help establish

traceability of items such as masses, proving rings, thermometers, balances, calipers, etc.

3.5 (12) Calibration and influence factor data according to the procedure.

NOTE: Calibrations or verifications done according to CTM, AASHTO, or ASTM procedures will be done according to the calibration or verification procedure requirements and a report generated to document the calibration or verification (even though the CTM, AASHTO, or ASTM procedure may not require a report).

3.6 Calibration Training and Evaluation: All Caltrans personnel performing calibrations or verifications shall be trained and evaluated for competency by the certified IA individual designated by the IA Program Coordinator. Results of these activities shall be recorded. Only personnel who have been judged competent will perform equipment calibrations or verifications. Records shall be maintained and filed along with the test equipment calibration or verification records of the CML.

3.7 Accommodation and Environment:

3.7 (1) Facilities, calibration areas, energy sources, lighting, temperature, humidity, and ventilation shall be such as to facilitate proper performance of calibrations or verifications.

3.7 (2) The environment where calibrations or verifications are performed shall not invalidate the results or adversely affect the required uncertainty of measurement. Particular care shall be taken when calibrations or verifications are done at construction field laboratory sites.

3.7 (3) All environmental influence factors for the calibration or verification shall be monitored and recorded on the calibration/verification report, if required, according to the calibration procedure.

3.8 Calibration Equipment and Reference Standards:

3.8 (1) All calibration equipment and reference standards used for calibrations shall be properly maintained according to manufacturer's recommendations. Maintenance shall be documented and kept in the calibration files for the equipment.

3.8 (2) Reference standards shall be calibrated, as required, to maintain NIST traceability, and a Caltrans calibration label shall identify the equipment ID, calibration date, due date, and who calibrated the standard.

3.8 (3) The calibration report for the reference standard shall include, as a minimum, measured values—observed for each parameter—found to be out of tolerance during calibration or verification.

3.9 Subcontracting Calibrations or Verifications: If the CML decides to subcontract the calibration or verification of test equipment, the subcontractor selection shall be documented using the “**SUBCONTRACTING CALIBRATIONS AND VERIFICATIONS CHECKLIST**”. (See Attachment B.)

A record of this subcontractor checklist—along with any relevant documents that relate to the questions—shall be maintained in the calibration files.

4. REFERENCED DOCUMENTS

4.1 Caltrans Publications:

Independent Assurance Program Manual (IAPM), January 2001, available at the IA Program home page:

<<http://www.dot.ca.gov/hq/esc/TransLab>>

California Test Methods (CTM), available at the following website:

<<http://www.dot.ca.gov/hq/esc/ctms/index.html>>

Caltrans *Construction Manual*, July 2001, Chapter 6, “Sampling and Testing,” available at the following website:

<<http://www.dot.ca.gov/hq/construc/manual2001/#chapter6>>

4.2 AASHTO Publications:

AASHTO R 18 “**Standard Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories,**” available at the home page for AMRL:

<<http://amrl.net/Portal/PublicDocs/Flap/R18.Pdf>>

4.3 FHWA Publications:

“**Federal-Aid Policy Guide,**” 23 CFR 637B, October 5, 1995, Transmittal 14, available at the following website:

<<http://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0637b.htm>>

4.4 National Institute of Standards and Technology (NIST):

Various publications, available at the following website:

<<http://www.nist.gov/>>

4.5 American National Standards Institute/National Conference of Standards Laboratories, ANSI/NCSL Z540-1-1994, “**Calibration Laboratories and Measuring and Test Equipment,**” available at the following website:

<<http://www.ncsli.org/publications/index.cfm>>

4.6 “**Calibration Buyers Beware**” by Philip Stein, published in *Quality Progress* Magazine, September 2000, available at the following website:

<http://www.measurement.com/articles/Calibration_Buyers_Beware.htm>

4.7 NCSL RP-10, “**Establishment and Operation of Electrical Utility Metrology Laboratory (8/91),**” available at the following website:

<<http://www.ncsli.org/publications/index.cfm>>

BALANCE/SCALE CALIBRATION PROCEDURE AND REPORT

Revised March 3, 2003

DATE:

BALANCE MFR./MOD./SER. NO./CAL. DATE/DUE DATE:

LOCATION:

STANDARD MASS CLASS/MFR./SERIAL NO./CAL. DUE DATE:

CALIBRATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides instructions for verifying balances/scales with an accuracy no better than four times the accuracy of the standard masses.*

***NOTE:** If a more accurate balance needs to be calibrated, a **reduced tolerance** may be used, = balance tolerance - standard mass tolerance, to verify the balance tolerance, according to NCSL RP-10, Appendix B.

B. EQUIPMENT REQUIRED

1. NIST traceable standard masses with a maximum tolerance, according to ASTM E 617, "Standard Specification for Laboratory weights and Precision Mass Standards," Table 1—required for a 25% accuracy requirement according to ANSI/NCSL Z540-1. (See *NOTE, above.)
2. Cleaning materials to clean the balance pan(s) and a level to verify the balance pan is level.
3. A temperature/humidity monitor to measure ambient conditions during the calibration.

C. TOLERANCE

Varies with type of balance; consult manufacturer's specifications.

Normally, the tolerance = +/- (linearity + 2(repeatability or precision)).

If there are no manufacturer specifications, use AASHTO M231 "Weighing Devices Used in the Testing of Materials," or CTM tolerances.

D. PROCEDURE

1. Turn on the balance and warm-up for the time required according to manufacturer's recommendations. If there are no warm-up requirements, leave on for at least 1/2 hour prior to calibration.
2. Determine the required standard mass tolerance by dividing the balance accuracy by 4. ***If the standard masses available do not meet this requirement, obtain masses that are accurate enough before proceeding.*** (It is also possible to use reduced tolerances, if the 4:1 accuracy ratio cannot be met with the most accurate standard masses available.)

3. Determine the calibration mass values by dividing the balance range by 10 and rounding the values down to a nominal single standard mass approximately = 10% of the balance range. Record the standard mass values and their standard mass tolerances on the Calibration Report. (Note that more than 10 calibration points may be required to load the balance to full range without using too many masses. For example, a 6200 g range balance could be loaded at 500 g intervals up to 6000 g. The last point would be 6200 g and the total calibration points would be 13. A minimum of 10 calibration points are required to verify the accuracy of the balance range.)
4. Determine and record the balance tolerances and accuracy ratios on the Calibration Report. The tolerance for the “ZERO” reading shall be 2 (repeatability or precision). With no manufacturer repeatability/precision specification, use 2(readability) for the “ZERO” tolerance for a digital balance and use readability for a mechanical balance.
5. Clean and level the balance and verify the balance has a stable “ZERO” before loading the first calibration mass in the center of the pan. Note any balance problems in the REMARKS section of Calibration Report. ***If the zero is not stable, eliminate or minimize the source(s) of the instability before proceeding. Note in REMARKS.***
6. Record the start temperature and humidity. The temperature and humidity must meet balance manufacturer operating specifications. ***If not, the balance cannot be calibrated. Note in REMARKS.***
7. Load the first mass in the center of the pan and record the first AS FOUND balance reading.
8. Continue stacking masses in the center of the pan and recording balance readings for the remaining AS FOUND calibration masses.
9. Remove all calibration masses and record the “ZERO” reading for the balance.
10. Verify the balance meets the specified tolerances. If the balance is out of tolerance, adjust it according to manufacturer instructions and do the AS LEFT balance reading calibration to verify the balance meets tolerances. ***If the balance cannot be adjusted into tolerance, take it out of service and either repair or replace it. Note in REMARKS.***
11. Once the balance meets specifications, record the stop temperature/humidity and place a completed Caltrans calibration label on the verified balance.
12. File this report in the appropriate lab file—even if the balance does not meet specifications.

OVEN CALIBRATION PROCEDURE AND REPORT

Revised March 3, 2003

DATE:

OVEN MFR./MOD./SERIAL NO./CAL. DATE/DUE DATE:

LOCATION:

STANDARD THERMOMETER(S) MFR./SERIAL NO./CAL. DUE DATE:

CALIBRATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides instructions for verifying ovens with an accuracy no better than four times the accuracy of the standard thermometer.*

***NOTE:** If a more accurate oven needs to be calibrated, a **reduced tolerance** may be used, = oven tolerance - standard therm. tolerance, to verify the oven tolerance, according to NCSL R P-10, Appendix B.

B. EQUIPMENT REQUIRED

1. NIST traceable standard masses with a maximum tolerance, according to ASTM E 617, Table 1–required for a 25% accuracy requirement according to ANSI/NCSL Z540-1. (See *NOTE, above.)

2. Brass thermometer well(s) to retain heat while the oven door is open.

NOTE: If the thermometer can be read without opening the oven door, no well is needed.

3. A clip to hold the thermometer to make it easy to read the thermometer.

NOTE: If the readout is outside the oven, no clip is needed.

4. Temperature/humidity meter to measure the ambient conditions.

C. TOLERANCE

Varies with type of oven; consult manufacturer's specifications.

Normally, the tolerance = +/- (temp. uniformity + temp. accuracy at 2 sigma).

If there are no manufacturer specifications, use AASHTO or CTM tolerances.

D. PROCEDURE

1. Determine the required standard thermometer tolerance by dividing the oven tolerance by 4. ***If the standard thermometer(s) available do not meet this requirement, obtain thermometer(s) that are accurate enough before proceeding.*** (It is also possible to use **reduced tolerances**, if the 4:1 accuracy ratio cannot be met with the most accurate standard thermometer(s) available.)

2. Determine the oven verification temperatures based upon the temperatures used to perform the AASHTO/ASTM test method or California Test Method. Record the **OVEN TEMP. SETTING, SHELF LOCATION**, and the **STD. THERM. TOL.** in the Calibration Report.
NOTE: *The oven temperature and tolerance required must be a least as good as the AASHTO/CTM requirement or the oven cannot be used to perform the test procedure. Note in REMARKS.*
3. Determine and record the **OVEN TOL.** and **ACCURACY RATIO** on the Calibration Report.
4. Note any oven problems in the **REMARKS**.
NOTE: *If the oven temperature is not stable, eliminate or minimize the source(s) of the instability before proceeding. Note in REMARKS.*
5. Record the start ambient temperature and humidity. The temperature and humidity must meet oven and thermometer manufacturer operating specifications. *If not, the oven cannot be calibrated. Note in REMARKS.*
6. Put the thermometer(s) in brass well(s)—if required—and position a thermometer in the center of each of the oven shelves to be verified.
7. Adjust the oven dial or temperature setting to the temperature to be verified.
8. Take the first temperature reading at the lowest temperature at least one hour after closing the oven door. If the oven does not produce the required temperature, adjust the oven until the required temperature is achieved. *If the oven cannot achieve the required temperature, the oven needs to be replaced or repaired. Note in REMARKS.*
9. Take three consecutive **AS FOUND** readings, taken no less than 1/2 hour apart. (**STD. READINGS** #1, #2, #3.)
10. Verify the oven meets the specified tolerances for all three consecutive readings.
11. If the oven is out of tolerance, adjust it according to manufacturer’s instructions and repeat steps 8 and 9 for the **AS LEFT STD. Reading (After ADJ.)** calibration to verify the oven meets tolerances.
12. *If the oven cannot be adjusted into tolerance, do not use the oven at this temperature or take it out of service and either repair or replace it. Note in REMARKS.*
13. Repeat steps 7 through 12 for each temperature to be verified.
14. Once the oven meets specifications for all temperatures to be used, record the stop ambient temperature/humidity and place a completed Caltrans calibration label on the verified oven.
15. File this report in the appropriate lab file—even if the oven does not meet specifications.

OVEN CALIBRATION REPORT

CALTRANS OVEN NUMBER/SERIAL NUMBER/TEMPERATURE(S)/TOLERANCE(S):

LOCATION:

AS FOUND/AS LEFT CALIBRATION DATE(S)/CAL. DUE DATE:

TEMP./HUMIDITY MONITOR MAKE/MODEL/MFR. ACCURACY:

START/STOP TEMPERATURE:

START/STOP RELATIVE HUMIDITY:

OVEN TEMP. SETTING & SHELF LOCATION °C/F	STD. THERM. TOL. +/-	AS FOUND STD. READING #1/#2/#3	AS LEFT STD. READING (AFTER ADJ.) #1/#2/#3	OVEN TOL. +/-	ACCURACY RATIO (SHOULD BE >/= 4:1)*

Accuracy ratio = balance tolerance/standard tolerance.

* If < 4:1 accuracy ratio, use reduced tolerance = balance tolerance - standard tolerance.

REMARKS OR DEVIATIONS FROM CALIBRATION PROCEDURE:

SIEVE PASS/FAIL EVALUATION AND REPORT

Revised October 28, 2002

DATE:
SIEVE MFR./SIZE(S)/SER. NO.(S)/LAST EVAL. DATE(S):
LOCATION:
EVALUATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides a way to determine if sieves meet AASHTO M 92 non-tolerance criteria according to CTM 201/202. This method also provides a way to meet the requirements of the Caltrans *Construction Manual*, Chapter 6 (July 2001), for independent assurance samplers and testers to check—at frequent intervals—the condition of all screens and sieves available for use on the job. Sieves may be evaluated individually or as a fine/coarse set.

B. EQUIPMENT REQUIRED

The examination may require the use of optical magnification to evaluate the finer sieve cloth. Manufacturer information may be required to identify some criteria (e.g., noncorrosive material).

C. TOLERANCE

AASHTO M 92, Table 1, sieve tolerances are not verified with this method.

D. PROCEDURE

1. Use the following table to record observations about the condition of sieves, pans, and covers according to AASHTO M92 (ASTM Designation: E 11-95) “Standard Specification for Wire Cloth and Sieves for Testing Purposes”, pass/fail criteria.
2. Mark the sieves that pass all criteria with a black marker evaluation date, MM/YY.

NOTE: *If any criteria fail, the sieve, pan, or cover shall be replaced or repaired.*

ITEM	PASS CRITERIA	PASS/FAIL
SIEVE FRAME	1) Rigid 2) Circular (except nonstandard frames; e.g., Gilson square frame sieves used in mechanical shaker) 3) Seamless 4) Noncorrosive material, such as brass or stainless steel 5) Easy sliding fit into any other sieve frame of same diameter (except nonstandard frames)	
SIEVE CLOTH	1) Noncorrosive “test grade” wire 2) Mounted in frame without distortion, looseness, or waviness 3) No creases 4) No foreign matter in cloth of new sieves 5) No wrinkles 6) No weaving defects (e.g., punctures/loose wires)	
SIEVE PANS AND COVERS	1) Made to nest with sieves 2) Noncorrosive	
SIEVE PRODUCT MARKING	Label with the following information: 1) U.S.A. Standard testing sieve 2) ASTM E 11-95 3) Standard metric sieve size designation 4) Name of manufacturer/distributor 5) English size designation (optional)	

REMARKS:

SIEVE CALIBRATION AND REPORT

Revised March 3, 2003

DATE:

SIEVE MFR./MOD./SERIAL NO./CAL. DATE/DUE DATE:

LOCATION:

DIMENSIONAL STD./MFR./SERIAL NO./CAL. DUE DATE:

CALIBRATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides instructions for verifying sieve average opening tolerance with an accuracy no better than four times the tolerance of the dimensional standard used.*

***NOTE:** If a more accurate sieve needs to be calibrated, a **reduced tolerance** may be used, = sieve tolerance - standard caliper/eye comparator tolerance, to verify the sieve tolerance, according to NCSL RP-10, Appendix B.

B. EQUIPMENT REQUIRED

1. NIST traceable standard caliper, plug gage, OR eye-comparator with a maximum tolerance required for a 25% accuracy requirement according to ANSI/NCSL Z540-1. (See *NOTE, above.)
2. Cleaning materials to clean the sieves prior to calibration, if required for good measurements.
3. A temperature/humidity monitor to measure ambient conditions during the calibration.

C. TOLERANCE

Varies with size of the sieve; consult AASHTO M 92, Table 1.

D. PROCEDURE

NOTE: Any sieve that fails any of the pass/fail criteria in AASHTO M 92 according to the “SIEVE PASS/FAIL EVALUATION AND REPORT” does not need to be calibrated and should be replaced/repared.

1. Determine the required dimensional standard tolerance by dividing the average opening tolerance in AASHTO M 92, Table 1, by 4. *If the dimensional standards available do not meet this requirement, obtain standards that are accurate enough before proceeding.* (It is also possible to use **reduced tolerances**, if the 4:1 accuracy ratio cannot be met with the most accurate standard available.)

2. Determine and record the **SIEVE SIZE AND SERIAL NUMBER** and **AVG. AND MAX INDIVIDUAL** tolerances in the Calibration Report.
3. Determine and record the **DIM. STD.** tolerances and **ACCURACY RATIOS** on the Calibration Report.
4. Note any sieve problems in the **REMARKS**. *If the dimensional standard is not stable, eliminate the source(s) of the instability before proceeding.*
5. Record the start temperature and humidity. The temperature and humidity must meet the dimensional standard, manufacturer operating requirements. *If not, the sieve cannot be calibrated.*
6. Examine the appearance of all openings. Measure any openings that appear oversize. Note any oversize opening in the **REMARKS** that exceeds the Max. Individual tolerance in AASHTO M 92, Table 1. *If any opening exceeds the tolerance, the sieve fails and shall not be used.*
7. Select three or four openings along a 45-degree line, according to AASHTO R 18, Figure X 14. Measure and record distance between the parallel sieve wires at the center of the opening in the X and Y directions.
8. Repeat step 7, rotating the sieve 90 degrees.
9. Calculate and record the average opening size in the X and Y directions. Record the maximum opening. Verify the sieve meets the specified tolerances for average and maximum individual opening. *If the sieve is out-of-tolerance, take it out of service and replace it.*
10. If the sieve meets specifications, record the stop temperature/humidity and place a completed Caltrans calibration label on the verified sieve.
11. File this report in the appropriate lab file—even if the sieve fails calibration.

SIEVE CALIBRATION REPORT

CALTRANS SIEVE NUMBER/SERIAL NUMBER/SIZE:
 LOCATION:
 AS FOUND/AS LEFT CALIBRATION DATE(S)/CAL DUE DATE:
 TEMP./HUMIDITY MONITOR MAKE/MODEL/MFR. ACCURACY:
 START/STOP TEMPERATURE:
 START/STOP RELATIVE HUMIDITY:

SIEVE SIZE & SERIAL NUMBER	OPENING MEASUREMENTS X & Y FOR # 1, 2, 3, 4 OPENINGS 45° LINE	OPENING MEASUREMENTS X & Y FOR A, B, C, D OPENINGS + 90° LINE	OPENING X & Y AVG. CALC. FOR ALL OPENINGS MAX. OPENING	ACC. RATIO (SHOULD BE >= 4:1)*	TOL.* ACCORDING TO AASHTO M92, TABLE 1 VARIATION OF AVG. & MAX. IND.
SIZE:	X:	X:	X:	AVG.:	AVG.:
S/N:	Y:	Y:	Y: MAX:	MAX:	MAX:
SIZE:	X:	X:	X:	AVG.:	AVG.:
S/N:	Y:	Y:	Y: MAX:	MAX:	MAX:

Accuracy ratio = balance tolerance/standard tolerance.

* If < 4:1 accuracy ratio, use reduced tolerance = balance tolerance - standard tolerance.

REMARKS OR DEVIATIONS FROM CALIBRATION PROCEDURE:

THERMOMETER CALIBRATION PROCEDURE AND REPORT

Revised March 3, 2003

DATE:

THERMOMETER MFR./MOD./SERIAL NO./CAL. DATE/DUE DATE:

LOCATION:

TEMP. STANDARD MFR./SERIAL NO./CAL. DUE DATE:

CALIBRATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides instructions for verifying thermometers with a range of 0 to 300 degrees Celsius (°C) and an accuracy no better than four times the accuracy of the temperature standard used.*

***NOTE:** If a more accurate thermometer needs to be calibrated, a **reduced tolerance** may be used, = thermometer tolerance - temperature standard tolerance, to verify the thermometer tolerance, according to NCSL RP-10, Appendix B.

B. EQUIPMENT REQUIRED

1. NIST traceable temperature standard with a maximum tolerance required for a 25% accuracy requirement per ANSI/NCSL Z540-1. (See *NOTE, above.)
2. A temperature/humidity monitor to measure ambient conditions during the calibration.

C. TOLERANCE

Varies with type of thermometer; consult manufacturer specifications. Normally, the tolerance = +/- (linearity + 2(repeatability or precision)). If there are no manufacturer specifications, use the readability of a liquid-filled or mechanical thermometer. Normally, bi-metal, dial thermometers are +/- 1% of range (e.g., a 300°C range dial thermometer would have a tolerance of +/- 3°C.). Digital thermometers' accuracy is, usually, +/- 1°C for a thermometer with a 0.1°C readability.

D. PROCEDURE

1. Determine the required temperature standard tolerance by dividing the thermometer accuracy by 4. ***If the temperature standard available does not meet this requirement, obtain a standard that is accurate enough before proceeding.*** (It is also possible to use **reduced tolerances**, if the 4:1 accuracy ratio cannot be met with the most accurate temperature standard available.)

2. Determine the calibration temperature values by dividing the thermometer range—above 0°C—by 4 and rounding the values down to a nominal temperature approximately = 25% of the thermometer range. Record the standard temperature values and their tolerances on the Calibration Report.

NOTE: The first temperature calibration point will be 0°C if the low end of the thermometer range is 0°C or less. For example, a -50 to 300°C thermometer would be calibrated at 0, 75, 150, 225, and 300°C. Five calibration points are the minimum needed to verify the accuracy of the thermometer range.

3. Determine and record the thermometer tolerances and accuracy ratios on the Calibration Report. Calculate and record reduced tolerances, if required.
4. Record the start ambient temperature and humidity. The temperature and humidity must meet thermometer and temperature standard manufacturer operating specifications. *If not, the thermometer cannot be calibrated.*
5. Adjust the temperature standard to the lowest calibration temperature and immerse the thermometer in the calibration bath/oven. (There are partial and total immersion thermometers that require different immersion depths to meet manufacturer specifications.) Note any thermometer/temperature standard problems in the **REMARKS**. *If the temperature standard reading is not stable (+/- 0.1°C/0.2 °F), according to the standard reading, eliminate the source(s) of the instability before proceeding.*
6. After the thermometer reading stabilizes (i.e., changes <= readability), read the temperature of the thermometer and standard and record the temperatures on the report at the end of this procedure.

NOTE: If the calibration standard bath/oven does not produce the required temperature, adjust the bath/oven setting until the required temperature is achieved.

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7. Adjust the calibration bath/oven to the next temperature point and repeat step 6 until all five temperature calibration points are done.
8. Verify the thermometer meets the specified tolerances. If the thermometer is out of tolerance, adjust it according to manufacturer instructions—if possible—and do the **AS LEFT** calibration to verify the thermometer meets tolerances.
9. *If the thermometer cannot be adjusted into tolerance, take it out of service and either repair or replace it.*

10. Once the thermometer meets specifications, record the stop temperature/humidity and place a completed Caltrans calibration label on the verified thermometer.

NOTE: The calibration label may not fit on the thermometer. If there is a case, put the calibration label on the thermometer's case. If there is no case, attach the calibration label to the thermometer with a string/wire—for example—so the label does not interfere with the use of the thermometer.

11. File this report in the appropriate lab file.

THERMOMETER CALIBRATION REPORT

CALTRANS THERMOMETER NUMBER/SERIAL NUMBER/RANGE/ACCURACY:
 LOCATION:
 AS FOUND/AS LEFT CALIBRATION DATE(S)/CAL. DUE DATE:
 TEMP./HUMIDITY MONITOR MAKE/MODEL/MFR. ACCURACY:
 START/STOP TEMPERATURE:
 START/STOP RELATIVE HUMIDITY:

STANDARD TEMP. READING	STANDARD TOL. +/-	AS FOUND THERM. READING	AS LEFT THERM. READING (AFTER ADJ.)	THERM. TOL. +/-	ACCURACY RATIO (SHOULD BE >= 4:1)*

Accuracy ratio = balance tolerance/standard tolerance.
 * If < 4:1 accuracy ratio, use reduced tolerance = balance tolerance - standard tolerance.

REMARKS OR DEVIATIONS FROM CALIBRATION PROCEDURE:

GENERIC CALIBRATION PROCEDURE AND REPORT

CAN BE USED TO DEVELOP A PROCEDURE AND REPORT FOR TEST EQUIPMENT WITH NO LOCAL CALIBRATION PROCEDURE AND REPORT

DATE:

UNIT UNDER TEST (UUT) MFR./MOD./SER. NO./CAL DATE/DUE DATE:

LOCATION:

STANDARD MFR./SERIAL NO./CAL DUE DATE:

CALIBRATOR NAME/TITLE/SIGNATURE:

A. PURPOSE

This method provides instructions for verifying a UUT with an accuracy no better than four times the accuracy of the standard.*

***NOTE:** If a more accurate UUT needs to be calibrated, a reduced tolerance may be used, = UUT tolerance - standard tolerance, to verify the UUT is in tolerance, according to NCSL RP-10, Appendix B.

B. EQUIPMENT REQUIRED

1. NIST traceable standard with a maximum tolerance required for a 25% accuracy requirement according to ANSI/NCSL Z540-1. (See *NOTE, above.)
2. Any standard accessories required.
3. A temperature/humidity monitor to measure ambient conditions during the calibration.

C. TOLERANCE

Varies with type of UUT; consult manufacturer's specifications. Normally, the UUT tolerance = +/- (linearity + 2(repeatability or precision)). If there are no manufacturer specifications, use AASHTO/ASTM or CTM tolerances.

D. PROCEDURE

1. Determine the required standard tolerance by dividing the UUT accuracy by 4. *If the standard available does not meet this requirement, obtain a standard that is accurate enough before proceeding.* (It is also possible to use **reduced tolerances**, if the 4:1 accuracy ratio cannot be met with the most accurate standard available.)
2. Determine the calibration point values by dividing the UUT range by the number of calibration points required for a good calibration (e.g., balances/scales require ten points plus zero).

3. Determine and record the UUT Tolerances and Accuracy Ratios on the Calibration Report.
4. Clean and verify the UUT is stable before calibration. Note any UUT or standard problems in the REMARKS. *If the UUT or standard is not stable, eliminate the source(s) of the instability before proceeding.*
5. Record the start temperature and humidity. The temperature and humidity must meet UUT and standard manufacturer's operating specifications. *If not, the UUT cannot be calibrated.*
6. Read and record the first **AS FOUND** UUT reading.
7. Continue reading and recording UUT readings for the remaining **AS FOUND** calibration.
8. Verify the UUT meets the specified tolerances. If the UUT is out of tolerance, adjust it per manufacturer instructions and do the **AS LEFT** calibration to verify the UUT meets tolerances.
9. *If the UUT cannot be adjusted into tolerance, take it out of service and either repair or replace it.*
10. Once the UUT meets specifications, record the stop ambient temperature/humidity and place a completed Caltrans calibration label on the verified UUT.
11. File this report in the appropriate lab file.

SUBCONTRACTING CALIBRATIONS AND VERIFICATIONS CHECKLIST

Calibration Service Provider:

Name:

Address:

Contact:

Phone Number:

E-mail Address:

QUESTION	ANSWER
1) Calibration services accredited to? a) ISO/IEC Guide 25 b) ISO/IEC 17025 c) ANSI/NCSL Z540-1	Accreditation: Y/N Standard:
2) Laboratory accreditation agreement? a) A2LA b) NVLAP c) Other	Signatory: Y/N Agreement:
3) Measurement parameters? a) Listed on scope of accreditation b) Ranges of equipment to be calibrated with scope	Parameters Listed: Y/N Parameters: Scope Ranges: Equipment Ranges:
4) Accredited calibration services specified on purchase order?	Accredited Specification: Y/N Purchase Order Number:
5) Certificates have logo from the accreditation body? Any exceptions to specific results?	Certificate Logo: Y/N Exceptions: Y/N What are the exceptions?

SAMPLES OF CALTRANS INDEPENDENT ASSURANCE FORMS

District IA Records Summary

Employer Affidavit of Testing Proficiency

Request for Caltrans Laboratory Accreditation

Typical Testing Technician and Evaluation Record

TL-0100, “Independent Assurance Certificate of Completion”

TL-0103, “Report of Witness Test”

TL-0104, “Corroboration Report Form”

TL-0107, “Corroboration Test Form”

TL-0108L, “Master List of Caltrans Accredited Laboratories”

TL-0108T, “Master List of Caltrans Qualified Testers”

TL-0110, “Independent Assurance Log Summary”

TL-0111, “Tester Certificate of Proficiency”

TL-0112, “Inventory of Materials Testing Equipment”

TL-0113, “Caltrans Accredited Laboratory Inspection Report”

DISTRICT IA RECORDS SUMMARY
UPDATES TO BE POSTED ON THE IA PROGRAM WEBSITE PERIODICALLY

MATERIALS CATEGORY	ITEMS TO FILE
100	Copies of: Form TL-0100, IA Certificate of Completion Form TL-0108L, Master List of Caltrans Accredited Laboratories Form TL-0108T, Master List of Caltrans Qualified Testers
200	Calibration Records: Form TL-0112, Inventory of Materials Testing Equipment
300	Caltrans Tester Records: <i>Copies of all tester records, including:</i> Form TL-0110, Independent Assurance Log Summary Form TL-0111, Tester Certificate of Proficiency <i>Copies of all witness and corroboration forms, including:</i> Form TL-0103, Report of Witness Test Form TL-0104, Corroboration Report Form Form TL-0107, Corroboration Test Form
400	Non-Caltrans Tester Records: <i>Copies of all tester records, including:</i> Form TL-0110, Independent Assurance Log Summary Form TL-0111, Tester Certificate of Proficiency <i>Copies of all witness and corroboration forms, including:</i> Form TL-0103, Report of Witness Test Form TL-0104, Corroboration Report Form Form TL-0107, Corroboration Test Form
500	Qualification of Laboratories: Laboratory Qualification Binders TL-0113, Caltrans Accredited Laboratory Inspection Report
600	Copies of Reference Samples Program Reports

REQUEST FOR CALTRANS LABORATORY ACCREDITATION

To: _____, District Materials Engineer
Address: _____

City: _____ State: _____ Zip: _____

In accordance with the requirements of Caltrans *Independent Assurance Manual*, I am requesting Caltrans laboratory accreditation for our materials testing laboratory. I have reviewed all aspects and am satisfied that we meet or exceed the requirements detailed in the *Independent Assurance Manual*.

Requestor: _____
Position or Title: _____
E-mail: _____ Phone: _____
Laboratory Name: _____ Current AMRL
and/or CCRL: Yes: No:
Address: _____ Expiration Date: _____

City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____
Lab Manager: _____ E-mail: _____
Lab QC Manager: _____ E-mail: _____

Documents to be attached:

Caltrans Laboratory Accreditation Manual (CLAM) conforming to Section
#.#.#.#.#.#.#.#. of the Caltrans *Independent Assurance Manual*.

Testing Technician Training Evaluation(s), one for each tester, copies shall be included in
Section #.#.#.#.#.#.#.#. of the CLAM

Employer Affidavit(s) of Testing Proficiency, one for each tester; copies shall be included in
Section #.#.#.#.#.#.#.#. of the CLAM.

Documents for review at the lab:

Facility Safety Manual

Caltrans Laboratory Safety Manual

Laboratory Procedures Manual (LPM)

Calibration and Service Documentation (detailed)

Laboratory Quality Control Manual (LQCM) (the LPM and LCQM may be combined)

Copies of Current Applicable Test Procedures (CT, AASHTO, ASTM, and CT lab procedures)

(Signature of Requestor) Date: _____

TL-0100 (REV.06/00)

CERTIFICATE NO. _____



THIS CERTIFIES THAT

SUCCESSFULLY COMPLETED THE CERTIFICATION SESSION FOR

INDEPENDENT ASSURANCE

GIVEN BY THE DIVISION OF MATERIALS ENGINEERING
AND TESTING SERVICES

DATE ISSUED

(VALID FOR 1 YEAR)

INDEPENDENT ASSURANCE PROGRAM
COORDINATOR

DIVISION CHIEF, MATERIALS
ENGINEERING AND TESTING SERVICES

STATE OF CALIFORNIA . DEPARTMENT OF TRANSPORTATION
CORROBORATION REPORT FORM
 TL-0104 (rev. 06/00)

INSTRUCTIONS: *Use this form to compare split-sample test results (Test results of the tester are compared with the test results of the Independent Assurance Sampler)*

NAME (Tester)	VALID TL-0111 <input type="checkbox"/> Yes <input type="checkbox"/> No
DATE (When the split sample was presented to the Tester)	DATE (When the Tester's results were received by the IAST)
DATE (When the Independent Assurance results were completed)	

	CORROBORATION OF TEST RESULTS							
	TESTER		INDEPENDENT ASSURANCE		CORROBORATION BETWEEN THE TESTER AND INDEPENDENT ASSURANCE			
	TEST PROCEDURE <i>(Identify by Number)</i>	TEST RESULTS	SAMPLE I.D. NUMBER	TEST RESULTS	SAMPLE I.D. NUMBER	GOOD	FAIR	POOR 1

1 - SUBSEQUENT ACTION TAKEN FOR POOR CORROBORATION *(List all actions taken and follow-up test performed. Attach copy of each test report. If no action was taken, document reasons for no action taken).*

IA NAME (Please print)	DISTRICT
SIGNATURE (IA)	IA CERTIFIED? <input type="checkbox"/> Yes <input type="checkbox"/> No
IF YES, IA CERTIFICATE NUMBER	REPORT DATE

NOTE: ATTACH ALL TEST DATA (Form TL-0107)

STATE OF CALIFORNIA . DEPARTMENT OF TRANSPORTATION
CORROBORATION TEST FORM
 TL-0107 (REV.06/00)

INSTRUCTIONS: *This form is used by the Tester and Independent Assurance for corroboration testing. After testing, the Tester must submit this form to Independent Assurance. Each Form TL-0107 should be attached to Form TL-0104.*

(A) CALIFORNIA TEST 202 - SIEVE ANALYSIS OF COARSE AND FINE AGGREGATE

COARSE GRADING INFORMATION				FINE GRADING INFORMATION			
WEIGHT OF DRY SAMPLE <i>(nearest gram)</i>				WEIGHT OF DRY SAMPLE BEFORE WASHING <i>(nearest gram)</i>			
TYPE OF SHAKER				DRY WEIGHT AFTER WASHING <i>(nearest gram)</i>			
				SHAKING TIME (minutes)			
SHAKING TIME (minutes)				TYPE OF SHAKER			
SIEVE SIZE	Weight Retained <i>(nearest gram)</i>	Percent Retained <i>(nearest whole number)</i>	Percent Passing <i>(nearest whole number)</i>	SIEVE SIZE	Weight Retained <i>(nearest gram)</i>	Percent Retained <i>(nearest whole number)</i>	Percent Passing <i>(nearest whole number)</i>

(B) CALIFORNIA TEST 217 - SAND EQUIVALENT

CLAY READING *(highest 0.1 of a unit)* _____

SAND READING *(highest 0.1 of a unit)* _____

SAND EQUIVALENT *(highest whole number)* _____

(C) CALIFORNIA TEST 227 - CLEANLINESS VALUE

SEDIMENT HEIGHT <i>(nearest 0.1 of a unit)</i>	CLEANNESS VALUE <i>(whole number)</i>
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CHECK APPROPRIATE BOXES:

TESTER

INDEPENDENT ASSURANCE

VALID FORM TL-0111 ? YES NO

CERTIFIED? YES NO

IA CERTIFICATE NUMBER _____

TESTER'S NAME <i>(Please print)</i>	DISTRICT
SIGNATURE <i>(Tester)</i>	REPORT DATE

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
INDEPENDENT ASSURANCE
 TL-0110 (REV.06/00)

IA LOG SUMMARY SHEET: <i>(Print full Name of Tester)</i>	DISTRICT
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DATE	WITNESS OF TEST PROCEDURE <i>(Indicate Test Number)</i>	WITNESS OF MATERIALS SAMPLING <i>(Indicate Test Number)</i>	DID THE TESTER SUCCESSFULLY PASS THE WITNESS TEST?		WAS EQUIPMENT IN GOOD WORKING CONDITION?		DID EQUIPMENT HAVE A CURRENT CALIBRATION STICKER?		CORROBORATION COMPARISON <i>(Check One)</i>			COMMENTS OR FOLLOW-UP ACTION
			<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> GOOD	<input type="checkbox"/> FAIR	<input type="checkbox"/> POOR	
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			<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> GOOD	<input type="checkbox"/> FAIR	<input type="checkbox"/> POOR	
			<input type="checkbox"/> YES	<input type="checkbox"/> NO								

TL-0111 (REV.06/00)

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Presents this

CERTIFICATE OF PROFICIENCY

to



who is qualified to perform the following tests:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Test method & expiration date

Test method & expiration date

Certified Independent Assurance (IA)

Date Issued: _____

Note: This certificate is valid as long as the Tester complies with applicable requirements in Caltrans' Independent Assurance Program Manual.

CALTRANS QUALIFIED LABORATORY INSPECTION REPORT

Form TL-0113

Expiration date: _____

Inspected by: _____

IA No.: _____

Phone: _____

File: Materials Category 500

Laboratory: _____

Address: _____

City: _____ State: _____ Zip: _____

Lab QC Mgr.: _____ e-mail: _____

Telephone: _____ Fax #: _____

A certified Independent Assurance (IA) visited this laboratory on (Date) _____

Only the equipment to be used on Caltrans construction projects and/or local construction projects on the National Highway System was checked for qualification.

At the time of Caltrans Qualification, this laboratory had all necessary equipment to perform the tests methods indicated below. Testing personnel shall be Caltrans Qualified and possess a current Caltrans Certificate of Proficiency Form TL-0111 prior to performing any sampling or testing.

_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

A visual check was performed and documents provided as necessary for the following items:

- _____ Facility Safety Manual
- _____ Laboratory Procedures Manual
- _____ Laboratory Quality Control Manual
- _____ Proper test equipment
- _____ Copies of current applicable test procedures
- _____ Calibration and service documentation
- _____ Calibration stickers affixed to test equipment (dated within the 12 months)

On _____ this laboratory was *Caltrans Qualified* by _____
Date (Printed name of IA person)

(Signature of IA person)