

**TUOLUMNE COUNTY
DEPARTMENT OF PUBLIC WORKS**



**QUALITY ASSURANCE PROGRAM (QAP)
for
CONSTRUCTION OF CAPITAL IMPROVEMENT PROJECTS
Off the National Highway System**

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PURPOSE

The Quality Assurance Program (QAP) is a sampling and testing program that will provide assurance that the materials and workmanship incorporated into Tuolumne County Department of Public Works projects are in conformance with the contract specifications. The main elements of the QAP are as follows:

- Acceptance Tests (AT) – Sampling and testing, or inspection to determine the degree of compliance with contract requirements.
- Independent Assurance Sampling and Testing (IAST) – Verification that AT is being performed correctly, by qualified testers and laboratories.
- Source Inspection - Testing of manufactured or prefabricated materials at locations other than the job site; i.e., the location of manufacture.

APPLICABILITY

On-SHS Projects:

For projects on the SHS, the local agency must adopt the Caltrans QAP detailed in the following manuals and guides:

- [Caltrans Construction Manual](#)
- [Construction Manual Supplement for Local Agency REs](#)
- [Local Assistance Structure Representative Guidelines](#)
- [Independent Assurance Manual](#)

In addition, the current Caltrans Standard Specifications (CTSS) and Plans must be part of the Plans, Specifications and Estimate (PS&E). Test methods used must be as specified in the CTSS and special provisions.

This QAP applies to Federal-Aid projects off the SHS. Tests methods used may be either CTM, ASTM, AASHTO, or other nationally recognized test methods, but must be specified in the contract documents.

Off-SHS Projects:

All Federal Aid projects not listed on the State Highway System which are administered by the Tuolumne County Department of Public Works shall be governed by this local QAP. The minimum requirements are identified in the Non-SHS Projects portion of Section 16.11 Quality Assurance Program of the Caltrans LAPM.

APPROVAL

This local agency QAP has been prepared by a registered Civil Engineer and approved by the Director of Public Works. The local QAP shall be kept on file for Caltrans review.

ENGINEERING CHARGE

All laboratories shall be directed under the responsible charge of a Civil Engineer registered with the State of California with experience in inspection and testing construction materials. The Engineer shall certify the results of all tests performed by laboratory personnel under the Engineer's supervision.

CONTRACTOR INFLUENCE

In the event the Tuolumne County Department of Public Works elects to have the contractor pay for costs associated with sampling and testing, the contractor shall not select nor exercise any authority over the consultant laboratory. The consultant Engineer associated with this laboratory work shall provide an exculpatory declaration as part of the certified results.

MATERIALS LABORATORY

All sampling and acceptance testing not provided by Tuolumne County Department of Public Works staff shall be performed by a qualified private consultant. The materials laboratory shall contain certified test equipment capable of performing the tests conforming to the provisions of this QAP. All non-Caltrans laboratories shall have an approved QAP.

1. Correlation Testing Program – The materials laboratory shall be a participant in one or more the following testing programs:

- a. AASHTO Materials Reference Laboratory (AMRL)
- b. Cement and Concrete Reference Laboratory (CCRL)
- c. Caltrans' Reference Samples Program (RSP)

2. Certification of Personnel

All consultant personnel directly involved with Acceptance Testing and Independent Assurance Sampling and Testing be certified by one of more of the following:

- Caltrans District Materials Engineer.
- Nationally recognized non-Caltrans organizations such as the American Concrete Institute, Asphalt, National Institute of Certification of Engineering Technologies, etc.
- Other recognized organizations approved by the State of California and/or recognized by local governments or private associations.

3. Laboratory and Testing Equipment

The materials laboratory shall only use laboratory and testing equipment that is in good working order. All such equipment shall be calibrated at least once each year. All testing equipment must be calibrated by impartial means using devices of accuracy traceable to the National Institute of Standards and Technology. A decal shall be firmly affixed to each piece of equipment showing the date of the last calibration. All testing equipment calibration decals shall be checked as part of the Independent Assurance Testing and Sampling.

MATERIALS ACCEPTANCE PROGRAM

Materials acceptance program is used to determine the quality and acceptability of materials and workmanship incorporated into the project. The program must address soils and aggregates, and manufactured and fabricated materials.

Acceptance of Unprocessed and Processed Soils and Aggregates

The acceptance of processed and unprocessed soils and aggregates includes verification sampling, testing, and inspection. Examples of unprocessed materials include sand, rip rap, subgrade, and embankment and backfill materials. Examples of processed materials include aggregates, bases, PCC and HMA. The contract and the QAP combine to ensure the quality of the soils and aggregates entering the project.

Generally, the contract will specify what criteria the material must meet, and what test method will be used to determine if the material met or failed the criteria; This QAP specifies the minimum number of samples to be taken and tests to be performed to ensure the material has met the criteria, and where the material will be sampled. Sometimes, the contract documents will specify the frequency and location of the sampling and testing, overriding the QAP.

Responsibilities of the Resident Engineer (RE)

It is important that the RE read each contract and not assume a new contract has the same specifications as the last contract. The RE must ensure the correct criteria is used to determine if the material passed or failed. The passing criteria is found in the contract specifications, but in some cases, the specifications allow the contractor to submit mix designs which establish the criteria. For example, the contractor is allowed to submit gradation target values (TV) for HMA mix designs and chose X factors for concrete mix designs. Be sure mix designs are approved prior to work and that the lab and inspectors have been provided a copy of the approved mix design.

The RE must ensure the correct test method is used as specified in the contract. Verification and quality control testing must be performed in accordance with a recognized testing standard. While California Test Methods, the American Society for Testing and Materials (ASTM), and the American Association of State Highway and Transportation Officials (AASHTO) test methods are all acceptable test methods on local agency projects, the test method to be used must be specified in the contract documents at bid time. The RE or lab cannot change the test method during the project without first writing a CO and providing justification. The RE must ensure the correct version of the test method is used. When the specifications reference a test method by number, it indicates the test in effect on the date of the Notice to Bidders. This means the test methods for each project are fixed and are not necessarily the latest revisions.

The California Test Methods are published on the Internet at:

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

ASTM Test Methods are available at the following Internet address:

<http://www.astm.org>

AASHTO Test Methods are available at the following Internet address:

<http://www.transportation.org>

The RE must ensure that field personnel who perform tests for compliance with the specifications are certified to conduct the test method indicated by the contract. This is discussed further under Independent Assurance Program.

Testing and Sampling Frequency Tables

The sampling and testing shall occur in accordance with the attached LAPM Exhibit 16-R Sampling and Testing Frequency Table. This table is meant as a minimum guideline, and the Resident Engineer shall determine the actual frequency of testing for each project.

Test Data and Summary Logs

The RE must obtain test data and results from the lab in a timely manner and keep records of all samples and tests in the project files. The RE must keep a test results summary log for each test method performed more than once. Use Exhibit 16-Z2: Acceptance Testing Results Summary Log or a similar form. On larger projects, it may be necessary to keep multiple logs for the same test method, broken out by salient features such as compaction tests performed on the roadway structural section on one log, and those performed on structural backfill on a separate log. The use of a summary log facilitates the review of material sampling and testing by Caltrans and FHWA reviewing personnel, and assists the RE in tracking the frequency of testing.

Failing Test

Whenever failing tests occur, sufficient additional acceptance tests must be taken to isolate the affected work. Documentation of the results of such additional tests must be included in the records, including a description of the corrective measures taken. Corrective action or retesting of failing tests must be noted in the remarks column of the test summary log. Documentation of the reason that materials represented by failing tests were incorporated into the project must be in the project files.

Mix Design Approval and Checking

Mix designs must be submitted by the Contractor and include the name of the material plant, the product name, a mix design ID number, and item of work in which it is to be used. The RE must review and approve the mix design in writing. A copy of the approved mix design must be placed in the files. Field inspectors must verify that the mix delivered to the job site matches the approved mix design. The inspector must place a check mark adjacent to the mix ID shown on the weigh tag and initial the tag. Tags are to be collected at the point of delivery to the jobsite.

INDEPENDENT ASSURANCE PROGRAM (IAP)

The IA program consists of activities that are unbiased and are an independent evaluation of all the sampling and testing procedures used in the acceptance program. The requirements are defined in Title 23, Code of Federal Regulations, Chapter 1, Part 637 (23 CFR 637).

Per this CFR, IA program consists of two parts:

- Testing equipment be evaluated by using calibration checks and proficiency samples
- Testing personnel be evaluated by observation and proficiency samples

During project construction, the RE must verify that the IA program is being executed by performing the following tasks:

- Obtaining Certifications of all Sampling and Testing Personnel
- Obtaining Qualifications of all laboratories
- Verifying equipment is calibrated

All samplers and testers, including project, laboratory and consultant personnel, must possess a current certificate of proficiency for the tests performed. A copy of the certificate must be in the project files.

IA sampling and testing is not to be used for determining quality and acceptability of material incorporated into the job. Such tests are used only for the purpose of determining the reliability of testing personnel.

Certification of Sampling and Testing Personnel

All samplers and testers, including project, laboratory and consultant personnel, must possess a current certificate of proficiency for the tests performed. A copy of the certificate must be in the project files. It is important that samplers as well as testers are certified to ensure the integrity of the sample and that the sample was taken at the right time, from the right location, using the correct method, and is properly labeled.

The Joint Training and Certification Program (JTCP) was established by Caltrans, local agencies, and industry to make the certification process more efficient and to obtain consistent, reliable quality testing. The JTCP offers training and certification in hot mix asphalt, soils and aggregates, and Portland cement concrete.

For CTMs not covered by the JTCP, Caltrans will still provide certification. When test methods used are not covered by the JTCP or Caltrans, certifications must be obtained from other acceptable organizations such as ACI.

Qualification of Laboratory

All laboratories providing testing services for projects located in California must:

- Possess a current certificate of qualification.
- Be under the responsible engineering management of a California registered Professional Engineer with experience in inspection and testing of construction materials. The Engineer shall certify the results of all tests performed by laboratory personnel under his or her supervision.
- Maintain their laboratory testing equipment in accordance with recognized national calibration standards.
- Participate in one or all of the following:
 - a) The AASHTO Materials Reference Laboratory (AMRL)
 - b) The Cement and Concrete Reference Laboratory (CCRL) inspection programs
 - c) The Caltrans Reference Sample Program

These proficiency sample testing programs conform to the FHWA requirement that each State Transportation Agency must participate in an approved laboratory inspection and comparative sample testing program.

All laboratories which use Caltrans' test methods must participate in the Caltrans Reference Sample Program. Upon request, if CTMs are being used, Caltrans Materials Engineers will qualify local agency's (or consultant's) laboratories. Caltrans IA staff will issue Form TL-0113, Caltrans Accredited Laboratory Inspection Report, valid for one year. Those laboratories which do not use Caltrans' test methods must participate in the AMRL and CCRL programs to fulfill proficiency sample testing program requirements.

Equipment Calibration General

The local agency laboratory shall calibrate field construction laboratory equipment and portable field test equipment (sand cones, scales, moisture test equipment, slump cones, air meters, etc.) prior to use on construction projects, and re-calibrate as frequently as required. The maximum interval between calibrations is one year. The local agency is responsible for calibration of laboratory testing equipment used for testing on local agency projects, whether or not the equipment is owned by the local agency, a consultant contractor, or sub-contractor. Consultant laboratory-supplied equipment shall be calibrated by the consultant or local agency.

Calibration of test equipment must conform to Section 8-03, Field Tests of the [Caltrans Construction Manual](#). Two sections in the QAP manual describe the procedures that the IA personnel are to use when calibrating materials testing equipment. Upon proper calibration, a decal shall be firmly affixed to each piece of calibrated equipment. Decal type and required information are specified on page 63 of Appendix B of the Quality Assurance Program Manual. A manufacturer's or service contractor's decal is acceptable as long as the above-required information is readily available. Should such decal become unreadable or lost, then the equipment is to be re-calibrated as soon as possible. Where such equipment either requires repair or cannot be repaired, a timely repair or replacement shall be secured.

Equipment Calibration -Nuclear gauge

All nuclear gauges must be calibrated on National Institute for Standards and Technology (NIST) traceable blocks and have current calibration stickers.

Equipment Calibration -Materials Plants

Plants producing construction materials such as HMA, concrete, cement treated bases, lean concrete bases, etc. must have a current CEM-4204, Material Plant Quality Program (MPQP) Acceptance Sticker or California Test 109, Method for Testing of Material Production Plants approval. This ensures the accuracy and suitability of the scales and meters used to proportion materials, and is important to uniformity and quality of the material. The Material Plant Quality Program can be found at <https://dot.ca.gov/programs/construction/material-plant-qualityprogram>.

ACCEPTANCE OF MANUFACTURED OR FABRICATED MATERIALS

The acceptance of manufactured and fabricated materials is most frequently based on one of the following 4 methods:

Source Inspection

Source inspection is the inspection, sampling and testing of manufactured and prefabricated materials at locations other than the job site. It is most commonly performed on materials involving structural integrity or safety to the public, such as precast pre-stressed concrete members, structural steel, and poles for electrical systems. The purpose is to ensure that structural materials comply with contract requirements in regard to raw materials, fabrication processes, personnel certification, and in-process quality control testing.

The local agency determines which materials will be source inspected. For a list of manufactured or prefabricated materials that are commonly source inspected for Caltrans projects, see Table 6-2.1, Inspection of Fabricated and Manufactured Materials of the [Caltrans Construction Manual](#).

Source inspection is performed by the local agency or a qualified consultant. Caltrans no longer provides source inspection services for projects off the SHS. Caltrans may provide source inspection for projects on the SHS if terms are detailed in a cooperative agreement or encroachment permit. For more details on the inspection procedures, refer to Section 6-3, Field Tests, of the [Caltrans Construction Manual](#) and the Office of Structural Materials Practices and Procedures (OSMPP) manual.

Due to the costs incurred when traveling to inspect materials sourced far from the job site, Section 6-3.05B, Source Inspection Expense Deductions of the CTSS provides the details for deductions to be taken when applicable.

Verification at the source of fabrication does not guarantee acceptance at the job site. Table 6-2.1 referenced above also includes items that must be checked or rechecked at the job site to ensure that the materials are acceptable. The RE must inspect the material upon arrival to be sure it meets the requirements of the specifications and is undamaged by shipping and handling. The RE must obtain and file the source inspectors report.

Materials Accepted on the Basis of Authorized Materials List

The CTSS identifies some materials that must be on an authorized materials list. The list is available at: <https://dot.ca.gov/programs/engineering-services/authorized-materials-lists>. For contracts using the CTSS, the RE must verify the materials furnished are shown on the appropriate authorized materials list before the material is used on the project. Materials shown on the authorized materials list may also require a certificate of compliance or sampling and testing for acceptance.

Materials Accepted by Certificate of Compliance

The local agency may permit the use of certain manufactured products, materials or assemblies accompanied by a Certificate of Compliance (COC) prior to sampling and testing, provided these products, materials or assemblies do not involve structural integrity or safety to the public. Additionally, these items must have a history of having met specifications based upon previous sampling and testing. The manufacturer of the products, materials or assemblies shall sign the Certificate of Compliance and state that the included materials and workmanship conform in all respects to the project specifications. The contract documents must specify which materials require the Contractor to submit a Certificate of Compliance. The RE is responsible for ensuring that a Certificate of Compliance is furnished with each lot of these materials delivered to the work site. Refer to Caltrans Local Assistance Procedure Manual [Exhibit 16-T1: Materials Requiring a Certificate of Compliance Per the Caltrans Standards Specifications](#) and [Exhibit 16-T2: Materials Requiring a Certificate of Compliance Per the Greenbook](#) for lists of materials for which the contractor must submit a COC per the respective project specifications. The COC must be furnished before the material is incorporated into the work and include:

- Project number
- Certified material lot number matching lot tags affixed or stenciled to the released materials
- Manufacturer's signature
- A statement that the material complies with the specifications of the contract

All materials accepted on the basis of a signed Certificate of Compliance shall be documented in the inspector's daily reports. Inspect the material upon arrival to be sure it meets the requirements of the specifications and is undamaged by shipping and handling before accepting. Manufactured products, materials or assemblies used on the basis of a Certificate of Compliance may be sampled again at the job site and tested at any time during the life of the contract. Items found not in conformance with contract requirements must be rejected whether in place or not.

A Certificate of Compliance for each item shall be kept in the RE's file.

Materials Requiring a Buy America Certification

Steel and iron products and construction materials permanently incorporated into the project must comply with Buy America requirements of per 23 CFR 635.410 and Section 70914 of the Build America, Buy America (BABA) Act. All steel and iron products must be delivered with a COC stating all manufacturing processes involved in the production of the products occurred within the United States. These processes include:

- Rolling
- Extruding
- Machining
- Bending
- Grinding
- Drilling
- Coating
- Welding
- Smelting

In addition to the COC requirements mentioned earlier in this section, a Buy America COC must also include the mill markings or heat numbers. All manufacturing processes for construction materials must occur in the United States. Contractors must provide certificates of compliance with each project delivery for all construction materials used for the projects. Manufacturer's certificate of compliance must identify where the construction material was manufactured and attest specifically to the Buy America compliance.

The Buy America requirements apply to the entire construction contract if any federal-aid money has been authorized for any phase of the project, not just the construction phase. This policy is applicable to all phases of a project (such as design, environmental, right-of-way, or construction) covered under the National Environmental Policy Act (NEPA) document, regardless of the funding sources. Therefore, the local agency cannot circumvent the Buy America requirement by declaring that the material is being paid for with the non-federal portion of the funding.

Buy America does not apply to temporary materials not permanently incorporated into the project such as temporary steel used in falsework, sheet piling, or shoring. Buy America requirement does not apply to recycled steel nor pig iron and processed, pelletized, and reduced iron ore manufactured outside the United States. A minimal use of foreign iron and steel is allowed provided that the total cost of iron and steel products as delivered to the project site is less than \$2,500 or 0.1 percent of the total contract amount, whichever is greater. The LPA must track the amount of incorporated foreign steel and iron as the work proceeds to ensure that the minimal use threshold amount is not exceeded at any point in the contract. Once the cumulative value reaches the minimum threshold limit, then all

additional installed materials must be of domestic origin. Supporting documentation for this minimal use must be on file in the project records (i.e., invoices, including the cost of transportation).

PROJECT CERTIFICATION

Upon project completion the Resident Engineer shall complete and sign a Materials Certificate (Caltrans LAPM Exhibit 17-G). This Certificate shall be submitted to the Caltrans Local Assistance Engineer (for federally funded projects) in accordance with the LAPM and retained in the project construction files.

RECORDS

The Resident Engineer shall keep all QAP records on file, if applicable these include:

- Samples/Acceptance Test log summary
- Individual acceptance test records
- Certificates of Compliance
- Documentation of Qualified Testing Personnel and Testing Laboratories,
- Materials Certification signed at the completing of the project.

When two or more projects are being furnished identical materials simultaneously from the same plant, it is not necessary to take separate samples or perform separate tests for each project; however, copies of the test reports are to be provided for each of the projects to complete the records.

All documentation shall be incorporated into this project file. All records shall be kept for a period of at least three years following project completion.

COMPLIANCE

Failure to comply with the Local Agency QAP may result in loss of Federal funds.

Recommended By:

Blossom Scott-Heim

Blossom Scott-Heim, P.E.
Assistant Director

Approved By:

Kim MacFarlane, P.E.
Director of Public Works

Attachments:

- Caltrans LAPM Exhibit 16-S, Caltrans Test Method- ASTM Test Method Conversion Chart
- Caltrans LAPM Exhibit 16-R, Sampling and Testing Frequency Table
- Caltrans LAPM Exhibit 16-T1, Materials Requiring a Certificate of Compliance per Caltrans Standard Specifications
- Exhibit 16-Z2: Acceptance Testing Results Summary Log