



**U.S. DEPARTMENT OF TRANSPORTATION**

FEDERAL HIGHWAY ADMINISTRATION

CALIFORNIA DIVISION

650 Capitol Mall, Suite 4-100

Sacramento, CA 95814

September 21, 2007

IN REPLY REFER TO

HDA-CA

File #: 443

Document #: S50764

Mr. Will Kempton, Director  
California Department of Transportation  
1120 N Street  
Sacramento, CA 95814

Attention: Federal Resources Office, Room 3500  
For Bob Pieplow, Chief, Division of Construction

Dear Mr. Kempton:

SUBJECT: Joint Process Review on Quality Assurance Program

For the past six months, we have been coordinating with your Materials Engineering Testing Services (METS) and Division of Construction to finalize a Process Review for "Quality Assurance Program." The review was conducted with the assistance of various individuals within your Departments: METS, Local Assistance, and Construction as well as selected Independent Assurance staff and Resident Engineers in the field, to whom we would like to express our sincere appreciation.

In summary, the purpose of this review was to evaluate the effectiveness of Caltrans' implementation of findings and recommendations resulting from a Quality Assurance (QA) review performed in January 2004, review Local Agencies' QA processes, and to verify the proper implementation of quality assurance measures. To accomplish these objectives, the FHWA California Division Office, jointly with Caltrans, conducted a QA process review of five Caltrans Districts (8, 7, 4, 10, and 3) and five Local Agencies (City of Redlands, County of Los Angeles, County of Solano, County of San Joaquin, and County of Sacramento) in May 2007.

We have identified the following six areas for State and Local Agencies to evaluate and act upon in the short term:

- A) Caltrans should continue the training, which has been found to be beneficial, on a regular basis, to educate both existing and new personnel on current Quality Control / Quality Assurance (QC/QA) state-of-the-art practices and procedures.

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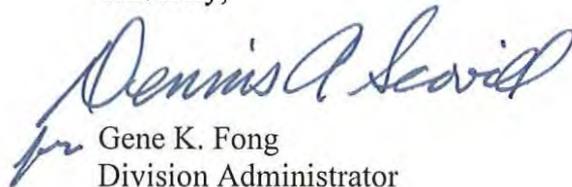
- B) Caltrans should complete development of and implement the on-line and web-enabled database for tester certification, or Caltrans should develop and implement a standard spreadsheet for projects on the NHS that will be used until such time as a database goes online.
- C) Caltrans should develop and implement an action plan on frequency for retesting the written portion of the certification program.
- D) Caltrans should implement that the **full name** of the tester be identified on all Caltrans' forms.
- E) Caltrans should **increase IA** resources in District 10 and 7.
- F) Caltrans should review procedures to ensure that Project Certification Memorandums are generated after each construction project and forwarded to FHWA.

We have identified seven recommendations that can be incorporated into your existing annual construction monitoring efforts:

- A) Caltrans should **implement** shadow testing to run gradations on the aggregate obtained from the **ignition oven**.
- B) Caltrans should develop and implement an action plan toward using volumetrics for asphalt acceptance replacing gradation.
- C) Caltrans should identify basic videotaping of California Test Methods (CTMs) for addressing the limitations in the existing tester certification process.
- D) Caltrans should develop **and** implement an action plan to review if each District should have a separate Independent Assurance (IA) structural person.
- E) Caltrans should develop and implement procedures to have the Central materials laboratory review all test procedures and equipment calibration in District laboratories.
- F) Caltrans Local Assistance should update and **implement** a revised Chapter 16 *Administer Construction Contracts* of the Local Procedures Manual for QAP (for projects on the NHS) and continue to provide training.
- G) Caltrans should **develop** and implement an action plan to expand the minimum corroboration testing to include Hot Mix Asphalt sampling (CT 125) and for Portland Cement Concrete such as Air Content (CT 504), Unit Weight (CT 518), and Penetration (CT 533).

Please review the recommendations, and **provide** us with an implementation plan by December 3, 2007. If you have any questions or would like to meet with us to discuss anything further, please contact Jason Dietz, Construction and Materials Engineer, at (916) 498-5886.

Sincerely,



Gene K. Fong  
Division Administrator

Enclosures

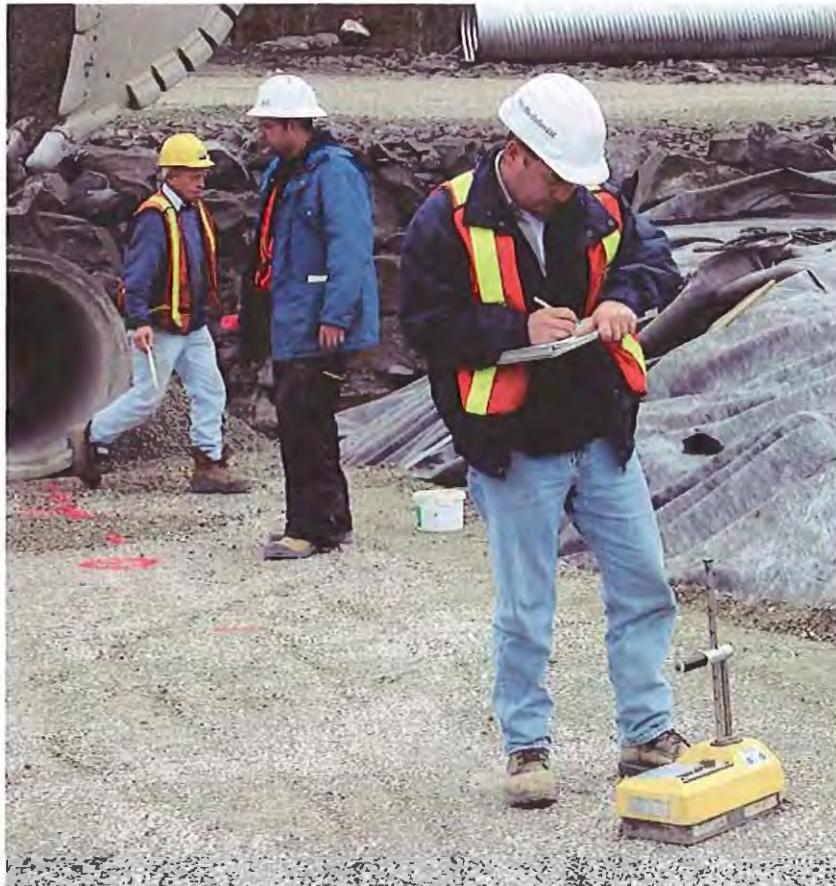
cc: (E-mail, w/Enclosures)  
Terry Abbott, Caltrans  
Gene Mallette, Caltrans  
Phil Stolarski, Caltrans  
Terrie Bressette, Caltrans  
Chuck Suszko, Caltrans  
Eugene Shy, Caltrans  
Don Roberts, Caltrans  
Sandra Garcia-Aline, FHWA  
Jason Dietz, FHWA  
Bren George, FHWA

JDietz/jh

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# Joint Process Review On Quality Assurance Program

September 2007



*Federal Highway Administration (FHWA-CA) (S50765)*



*California Department of Transportation  
(Division of Local Assistance #07-08)*

Approved:



**SANDRA A. GARCIA-ALINE**  
**California Division, Director of**  
**Field Operations Officer**

9/20/07  
Date

## **PARTICIPANTS OF THE QUALITY ASSURANCE REVIEW**

Review performed: May 7 - 10, 2007 and May 14 - 18, 2007

### **TEAM**

Federal Highway Administration (FHWA), California Division (CA) - Jason Dietz, Construction & Materials Engineer; Bren George, Field Operations Engineer

Caltrans Headquarters and Materials Engineering Testing Services (METS) - Rick Gifford, Special Funded Projects Engineer; Eugene Shy and Don Roberts, Local Assistance Engineers; Cathrina Barros and Liza Valencia, Flexible Pavement Materials – Independent Assurance (IA) Oversight; Leros Lane, District Materials Engineer – D02 IA Supervisor

### **DISTRICT AND LOCAL AGENCY STAFF INTERVIEWED**

Caltrans District 8, San Bernardino - Bruce Kean, District Materials Engineer – D08 IA Supervisor; Terry Chapman, IA; Wael Faqih, Resident Engineer (08-327504); Ken Loncharich, Resident Engineer (08-474404)

Caltrans District 7, Los Angeles - Eric Collar, Robert Jarquin, Robert Achuela, and Arnold Truong, IA; Alex Perez, Quality Control / Quality Assurance (QC/QA) Coordinator; Jagdish Patel, Resident Engineer (07-201204); Fred Young, Resident Engineer (07-122004)

Caltrans District 4, Oakland - Alex Sotoudehnik and Victor Antido, IA; Patel Bharat, Resident Engineer (04-249044)

Caltrans District 10, Stockton - Robert Rogers, IA; Greg Berry, Senior Oversight Civil Engineer; Normer Gutierrez, Oversight Resident Engineer (10-4454U4); Rick Deml, Resident Engineer for Parsons-Brinkerhoff-Consultant; Ken Blake, Area Resident Engineer for Parsons-Brinkerhoff; Paul Lukkarila, Engineer for Kleinfelder

Caltrans District 3, Marysville - Terry Stratford and Del Courtney, IA; Kyle Ingvoldsen, Senior Resident Engineer (03-3822V4)

City of Redlands –Sean Yeung, Local Assistance Engineer; Liang Tang, Local Assistance Engineer; Bill Hemsley, Capital Projects Manager

County of Los Angeles – Eric Samaniego, Local Assistance Engineer; Greg Kelley, Assistant Deputy Director; Hung Nguyen, Resident Engineer; Ramon Robles, IA; Anthony Nyivih, Principal Engineer (PE); Joel Zaragoza, Pavement Management; Issa Adawiya, Area Supervisor; Joel Zaragoza, Associate CE; Paul Axammonu, Principal CEA; Raymond Fraser, Senior Construction Inspector; Bei Li, Transportation Engineer

County of Solano – Johnson Lee, Local Assistance Engineer; William Lindenberger, Senior Engineer Technician; Ken Flores, Engineering Services Supervisor  
County of San Joaquin – Yousef Yousef, Local Assistance Engineer; Jeff Woltkamp, Accountant Auditor II; David Wang, Associate CE; Jess Foronda, Accountant Auditor II; Peter Nuon, Engineer III

County of Sacramento – Steve Propst, Local Assistance Engineer; Frances Worth, Senior CE; Ali Chehade, Supervisor Construction Inspector; Carmencita Dimal, Municipal Service Agency (MSA) Senior Accountant; Christopher Abruscato, MSA Principal Engineer Technician; Harnail Nijjar, MSA Supervisor Engineer Technician; Gilberto Penales, Principal Construction Inspector; Refugio Razo, Senior CE; Hardeep Sidhu, Senior CE; Ken Wilk, Associate CE; Robert Van Dyke, Associate CE

## I. EXECUTIVE SUMMARY

Departments of Transportation have come to realize the importance of Quality Assurance (QA) based on their experience that failure to conform to either material or construction specifications can result in the early failure of highway components. Construction QA programs are intended to ensure that the quality of the materials and construction incorporated into highway products fully comply with the specifications. QA programs have evolved since the 1960s into what are now sometimes second or third generation QA programs. The umbrella of any QA program contains three main elements: Quality Control (QC), Acceptance Testing (AT), and Independent Assurance (IA) testing. The manner in which these elements are administered will have an impact of the overall quality of the program.

The objectives of this process review were to examine the effectiveness of Caltrans' implementation of findings and recommendations resulting from a Quality Assurance review performed in January 2004, review Local Agencies' QA processes, and to verify the proper implementation of quality assurance measures. To accomplish these objectives, the FHWA California Division Office, jointly with Caltrans, conducted a QA process review of five Caltrans' Districts (8, 7, 4, 10, and 3) and five Local Agencies (City of Redlands, County of Los Angeles, County of Solano, County of San Joaquin, and County of Sacramento) in May 2007.

The outcome of this review is reported as follows:

1. Results of the review as they relate to the follow-up of the 2004 Review.
2. Results of the review of the Local Agency projects.
3. Observations and recommendations arising as a result of the review and the Section 39 Team review.

FHWA will frame the outcome of the review as follows:

1. "Finding" – A determination of an activity and/or process that do not meet Federal Requirements. In other words, they are more compliance based and their associated recommendations are listed. Findings must be corrected by Caltrans or the Local Agency.
2. "Observation" – The FHWA reviewers' observations of a process or activity that was a result of the process review. Observations may be related to a given topic or regarding a new topic. Observations do not require an action on the part of Caltrans.
3. "Recommendation" – A process or activity that FHWA is suggesting for Caltrans' consideration to enhance or result in a more effective and efficient quality assurance process. Recommendations do not require an action on the part of Caltrans.

The review found that Caltrans' efforts to comply with requirements for IA testing are rated satisfactory, and their efforts to meet the requirements for sampling and testing are satisfactory. However, the review found some deficiencies in the Caltrans' materials

sampling and testing program. On the Local Agency level, the Caltrans oversight and Local Agency IA requirements of projects on the State Highway System (SHS) only reflect a satisfactory rating on those local agency administered projects. In general, sampling, testing, and IA efforts on local agency projects (on and off the SHS) need improvement.

Since 2004, the Materials Engineering Testing Services (METS) has taken a very active role in implementing the Caltrans IA Program resulting in major improvements to the Reference Sampling Program (RSP). However, the Acceptance Sampling and Testing Program on the SHS, which is the responsibility of Caltrans' Construction and Local Agencies doing work on the SHS, has shown little improvement from past process reviews that were documented in 1988, 1991, 1992, and 2004 process reviews.

The following finding and recommendations are a result of this review. The Team developed the following recommendations, which are explained in detail later, to assist Caltrans in their oversight and stewardship responsibility for the quality assurance program.

#### **Recommendations from Findings:**

**Recommendation:** Caltrans needs to implement a record retention procedure to ensure compliance with 49 CFR 18.42 which requires that Caltrans maintains records for three years subsequent to final voucher reimbursement or through the period of litigation, whichever is later.

**Recommendation:** Caltrans should develop and implement an action plan to create a Final Material Certification (FMC) form for each project, which will then comply with the 23 CFR 637.207 requirements.

#### **Recommendations resulting from Observations:**

**Recommendation #1:** Caltrans should implement shadow testing to acquire gradations on the aggregate obtained from the ignition oven.

**Recommendation #2:** Caltrans should continue the training, which has been found to be beneficial, on a regular basis, to educate both existing and new personnel on current Quality Control / Quality Assurance (QC/QA) state-of-the-art practices and procedures.

**Recommendation #3:** Caltrans should have a QC/QA Coordinator in each District.

**Recommendation #4:** Caltrans should develop and implement an action plan toward using volumetrics for asphalt acceptance replacing gradation.

**Recommendation #5:** Caltrans should complete development of and implement the on-line and web-enabled database for tester certification, or Caltrans should develop and

implement a standard spreadsheet for projects on the NHS that will be used until such time as a database goes online.

**Recommendation #6:** Caltrans should identify basic videotaping of California Test Methods (CTMs) for addressing the limitations in the existing tester certification process.

**Recommendation #7:** Caltrans should develop and implement an action plan to review if each District should have a separate Independent Assurance (IA) structural person.

**Recommendation #8:** Caltrans should develop and implement an action plan on frequency for retesting the written portion of the certification program.

**Recommendation #9:** Caltrans should develop and implement procedures to have the Central materials laboratory review all test procedures and equipment calibration in District laboratories.

**Recommendation #10:** Caltrans should implement that the full name of the tester be identified on all Caltrans' forms.

**Recommendation #11:** Caltrans Local Assistance should update and implement a revised Chapter 16 *Administer Construction Contracts* of the Local Procedures Manual for QAP (for projects on the NHS) and continue to provide training.

**Recommendation #12:** Caltrans should develop and implement an action plan for further corroboration test methods for Hot Mix Asphalt would be Sampling (CT 125). Portland Cement Concrete Air Content (CT 504), Unit Weight (CT 518), and Penetration (CT 533) are the minimum tests.

**Recommendation #13:** Caltrans needs to revise the CTMs to English.

**Recommendation #14:** Insure the implementation of PACRS for all QC/QA projects to assist in timely reporting of test results.

**Recommendation #15:** Caltrans needs to provide FHWA with an update on PACRS.

**Recommendation #16:** Caltrans should increase IA resources in Districts 7 and 10.

**Recommendation #17:** Caltrans should review the IA program in all 12 Districts annually.

**Recommendation #18:** Caltrans should provide Project Certification Memorandums to FHWA after each construction project.

**Recommendation #19:** Caltrans update its tester certification written exams.

**Recommendation #20:** Caltrans should develop a risk-based evaluation for creating a statewide tester certification program.

## **II. INTRODUCTION**

The role of a Quality Assurance (QA) program is to ensure that the quality of the materials and construction incorporated on all Federal-aid highway projects on the National Highway System (NHS) are in conformity with the requirements of approved plans and specifications. The QA programs developed by the State DOTs must adhere to 23 CFR 637 and be approved by Federal Highway Administration (FHWA) for projects on the NHS. These programs lay out systematic actions necessary to provide confidence that the material and workmanship incorporated into a project will satisfy given requirements.

The 2005 Financial Integrity Review and Evaluation (FIRE) Program established oversight procedures to ensure that Federal-aid funds are properly managed and effectively used and that safeguards are in place to protect against minimize fraud, waste, and abuse. Proper quality assurance procedures are safeguards and essential to providing the fiscal accountability and oversight required by the FIRE program.

In 2006, a National Review Program (NRP) report, "Quality Assurance in Materials and Construction," was written by FHWA to evaluate, at the corporate level, program effectiveness, ensure more program consistency, and identify successful QA practices across the Nation. The NRP is an annual program of reviews conducted by teams comprising experienced FHWA personnel. Review topics were selected through an annual call followed by a solicitation for Team members from FHWA unit offices. QA was selected for review in 2006 because the program ranked as one of the top five areas of interest for review by FHWA.

Quality construction is fundamental to meeting the mission of the FHWA, and QA is the primary means by which the FHWA ensures that it has confidence in the quality of the highway products delivered.

## **III. REFERENCES**

In spring 2006, FHWA Field Operations (FO) performed a risk analysis and identified construction materials quality as a high-risk area, particularly in light of the findings of recent QA National Review and limited Federal and State oversight for transportation projects. Thus, the FHWA California Division management and FO engineers supported a follow-up review on the implementation of the findings and recommendations of the 2004 QA review.

For this follow-up review, the Team reviewed records and interviewed staff from:

- Five Caltrans District IA offices – Districts 8, 7, 4, 3, and 10
- Materials Engineering Testing Services (METS) – Statewide IA oversight
- Seven Caltrans on-going projects – 08-327504, 08-474404, 07-201204, 07122004, 04-249044, 10-4454U4, 03-3822V4
- Five Local Agency projects:
  - √ One project (County of San Joaquin) on the National Highway System
  - √ Four projects in the City of Redland, County of Los Angeles, County of Solano, and Sacramento County.

Since the 2004 report mainly focused on Caltrans' projects, it was determined to examine if Caltrans' Quality Assurance Program (QAP) was being followed on Local Agency projects on the NHS and if Local Agencies were following their own QAPs off the NHS.

During November 2006, the process of developing a work plan began; in January 2007, the draft work plan was forwarded to Caltrans' METS and the Division of Local Assistance for review and comments. A final approved work plan was distributed to Caltrans in early in February 2007, as shown in Appendix A. The QA review team conducted its review from May 7<sup>th</sup> to the 18<sup>th</sup>.

At the State's request, an FHWA led Peer Review Team was created in March 2007 to assist Caltrans on the remaining issues regarding the rewrite of the Standard Specifications Section 39, "Hot Mix Asphalt." This team also reviewed and advised Caltrans on the specification areas which pertained to important factors in QC/QA recommendations in the 2004 report. The purpose of the team was to advise and resolve issues to provide for a joint Caltrans and Industry completion of the re-write. This QA Process report was delayed to provide an opportunity to include the outcome in this summary. The specifications were completed and moved into implementation in August 2007.

#### **IV. PROCESS OBJECTIVES**

The objective of this process review was to evaluate the effectiveness of Caltrans' implementation of findings and recommendations of a July 8, 2004 memorandum signed by the FHWA, California Division Office, Construction and Materials engineer that directed a follow-up meeting or letter from Caltrans that addresses whether any of the recommendations have been considered or implemented. As a result, a meeting took place in October 2004 during which Caltrans agreed they would in time implement these recommendations; however, with them recently reinitiating their Reference Sampling Program (RSP) and updating their QC/QA and standard specifications, it will take some time to implement all of recommendations. In March 2006, they hired a new Independent Assurance Manager to run the RSP program, which seems to be improving.

Essentially, this process review shall:

1. Verify the following QC/QA improvements:
  - a. Setting the maximum size of a lot to 20 contractor test results
  - b. Revising the ratio of State tests used for verification to approximately 1 in 5
  - c. If a State procedure has been developed to direct construction personnel to monitor contractor QC testing procedures and documentation
  - d. Procedures for verifying contractor test results need to be revised to ensure that AC pay is ran after each State verification test is ran.
  - e. The specification should be revised to ensure that the contractor retains records for 3 years.
  - f. The specification should be revised to direct the contractor to amend the QC plan to incorporate updated tester certificates.
  - g. The State should consider running gradations on the aggregate obtained from the ignition oven.
  - h. The State should consider developing training for the QC/QA specification.
  - i. Consideration should be given to METS providing increased oversight and training of the District QC/QA Coordinators to provide uniform application of the specifications between Districts.
  - j. In the long term the State should move toward using volumetrics for asphalt acceptance replacing gradation. This will address concerns with contractor adjustments to asphalt content in the mix.
2. Verify improvements in the tester certification program:
  - a. Distribution of list of certified testers are properly filled in the project records.
  - b. Training for tester certification was encouraged to be further developed.
  - c. The structural testers need to be instructed on the requirements for certification.
  - d. Procedures need to be reviewed to ensure proper distribution of lists of certified testers and proper filing in project records.
  - e. Consideration should be given to increase the resources in District 6 IA.
  - f. Caltrans should develop a frequency for retesting the written portion of the certification program.
  - g. Caltrans should expand policy and procedures for the overall certification program to cover decertification procedures.
  - h. METS should review the IA certification program performed in the districts to promote uniformity.
3. Caltrans needs to develop a procedure to have the Central materials laboratory to review test procedures and equipment in district laboratories.
4. Test reports submitted by outside laboratories need to indicate the person testing the material.
5. We have concerns that the review of Local Agency construction projects by Caltrans District Local Assistance may not be performed on a consistent basis.
6. Caltrans should add some additional collaborative testing to the IA program.

This evaluation report contains summaries of the responses from resident engineers, project engineers, and various other key personnel during interviews. It is also based on the review of relevant project documents.

The outcome of this review is reported as follows:

1. Results of the review as they relate to the follow-up of the 2004 Review.
2. Results of the review of the Local Agency projects.
3. Observations and recommendations arising as a result of the review and the Section 39 Team review.

FHWA will frame the outcome of the review as follows:

1. **“Finding”** – A determination of an activity and/or process that do not meet Federal Requirements. In other words, they are more compliance based and their associated recommendations are listed. Findings must be corrected by Caltrans or the Local Agency.
2. **“Observation”** – The FHWA reviewers’ observations of a process or activity that was a result of the process review. Observations may be related to a given topic or regarding a new topic. Observations do not require an action on the part of Caltrans.
3. **“Recommendation”** – A process or activity that FHWA is suggesting for Caltrans’ consideration to enhance or result in a more effective and efficient quality assurance process. Recommendations do not require an action on the part of Caltrans.

The general recommendations suggested in this report are presented to the Deputy District Directors of Construction and Division Chiefs of Construction for their use in development and implementation of action plans to address recommendations in each district, region, and headquarters.

## **V. SCOPE AND APPROACHES**

During the course of this evaluation, the Team explored whether proper implementation of quality assurance measures were conducted. The scope consisted of evaluating the 2004 findings (Appendix B); reviewing Caltrans’ and local agency processes, administration, activities, and control of the quality assurance procedures through site visits; and to verify that Caltrans and the Local Agencies are meeting commitments for quality assurance. These site visits were coordinated with Caltrans and included interviews with appropriate district and headquarters personnel.

This review involved interviews with Caltrans’ Headquarters and District personnel, and City and County employees; all who had direct or indirect involvement in QA projects. The panel also evaluated applicable procedural guidance and policy memoranda. Interviews were conducted with the following QC/QA personnel and oversight managers (see page 2 for a list of the staff involved):

1. District IA Contacts
2. District Construction Resident Engineers and/or Project Managers
3. District Local Assistance Engineers (DLAEs)
4. City and County Engineers

## VI. 2004 REVIEW FOLLOW-UP

Unless specifically noted, the finding and recommendations are for Caltrans and Local Agency projects on the NHS.

1. The following improvements to the existing Caltrans' QC/QA program should be examined:
  - a. Consideration should be given to setting the maximum size of a lot to 20 contractor test results at least for verification purposes. **Resolved through latest rewrite of Specification Section 39, "Hot Mix Asphalt," Standard Specification was posted on July 27, 2007, which incorporates this change.**
  - b. The State should consider revising the ratio of State tests to contractor test results used for verification to approximately 1 in 5. **Resolved through latest rewrite of Specification Section 39, "Hot Mix Asphalt," Standard Specification was posted on July 27, 2007, which incorporates this change.**
  - c. A State procedure should be developed to direct State construction personnel to monitor contractor QC testing procedures and documentation. **Resolved through current in place procedures.**
  - d. The procedure for verifying contractor test results needs to be revised to ensure that AC Pay is run after each State verification test is ran. **Resolved through current in-place procedures.**
  - e. The specification should be revised to ensure that the contractor retains records for 3 years. **Resolved through current Standard Specifications of May 2006.**

**New Finding:** Record retention, according to 49 CFR 18.42, requires that Caltrans maintains records for three years subsequent to final voucher reimbursement or through the period of litigation, whichever is later.

**Recommendation:** FHWA will work with Caltrans to implement the appropriate process.

- f. The specification should be revised to direct the contractor to amend the QC plan to incorporate updated tester certificates. **Resolved through the State QC manual and local agency QAP manual.**
- g. The State should consider running gradations on the aggregate obtained from the ignition oven. **Not resolved through latest rewrite of Specification Section 39, "Hot Mix Asphalt," Standard Specification.**

**New Observation:** The QC/QA2 specifications allowed the contractor to run gradations after ignition testing, but the gradation tests were not required. It was

hoped that this would provide Caltrans with the data necessary for a complete analysis. However, from this review, it appeared that this attempt was unsuccessful as no data has been acquired from the contractors as a result.

**Recommendation:** Caltrans should implement specifications that will require shadow testing of gradations based on the aggregate obtained from the ignition oven.

- h. The State should consider developing training for the State QC/QA specification. **Resolved through Caltrans will be including QC/QA Training in the statewide joint training for the new Section 39 to be conducted October 2007 through February 2008 for Caltrans, Industry and local agencies.**

**New Observation:** Districts lacked the understanding of the current version of the QC/QA specifications.

**Recommendation:** Caltrans should continue training on a regular basis to educate both existing and new personnel on current QC/QA state-of-the-art practices and procedures.

- i. Consideration should be given to METS providing increased oversight and training of the District QC/QA Coordinators to provide a uniform application of the specification between Districts. **Not resolved through the interviews of this review by 5 State projects.**

**New Observation:** Following implementation of Section 39, training will be available for both existing coordinators and the new ones.

**Recommendation:** The Team recommends that each District have a QC/QA coordinator.

- j. In the long term, the State should move toward using volumetrics for asphalt acceptance replacing gradation. This will address concerns with contractor adjustments to asphalt content in the mix. **Resolved through latest rewrite of Specification Section 39, 'Hot Mix Asphalt,' Standard Specification. Volumetrics are required in mix design and production start up and the state will be collecting data from "for information only" submittals by the contractor and state during production.**

**New Observation:** The State plans to convert to volumetrics in one to two years following the implementation of Section 39.

**Recommendation:** Caltrans should develop and implement an action plan toward using volumetrics for asphalt acceptance replacing gradation.

2. The following improvements to the existing tester certification program should be considered:
- a. Verify if the distribution of list of certified testers are properly filed in project records. **Not resolved by the 5 State projects that were reviewed. None of the projects reviewed had adequate tracking systems for qualified testers and laboratories.**

**New Observation:** From the review, it was found that a previous statewide database is no longer collecting information, and a newer database version has not been implemented. But, FHWA has been assured that the new on-line, web enabled database is nearing completion.

**Recommendation:** Caltrans should complete the on-line, web-enabled database before next construction season. If the database will not be completed prior to the start of the construction season 2008, Caltrans should develop and implement a standard spreadsheet that will be used until such time as a database goes online (see Appendix C, D, E).

- b. Training for tester certification was encouraged to be further developed. **Not resolved by the 7 State projects that were reviewed.**

**New Observation:** Since there is no formal certification training, testers need to be qualified in a timely manner to ensure quality of CTMs. Caltrans' Consultant Contract will review Caltrans' and other States' programs for tester training and certification. The review will offer alternatives for the Caltrans' management; and once one is chosen, will assist Caltrans in establishing joint tester training and certification.

**Recommendation:** Caltrans should identify basic videotaping of CTMs for addressing the limitations in the existing tester certification process.

- c. The structural testers need to be instructed on the requirements for certification. **Not resolved by the 7 State projects that were reviewed.**

**New Observation:** The benefit of such recommendation has been observed in District 3, where the additional person has extra knowledge and background on structural-related test methods, which alleviates the amount of the workload for the IA contact (see Appendix F).

**Recommendation:** Caltrans should develop and implement an action plan to review if each District should have a separate IA structural person.

- d. Consideration should be given to increase the resources to District 6 IA. **Resolved through findings and recommendations of the Quality Assurance review completed in 2004.**

- e. The State should develop a frequency for retesting the written portion of the certification program. **Not resolved.**

**New Observation:** Caltrans needs to evaluate this further. This topic will be discussed as part of the review of the IA program being conducted by the consultant contract.

**Recommendation:** Caltrans should develop and implement an action plan on frequency for retesting the written portion of the certification program.

- f. The State should expand its policy and procedures for the overall certification program to cover decertification procedures. **Resolved with the revised 2005 IA Manual that now covers the decertification procedures.**
- g. METS should review the IA certification program performed in the Districts to promote uniformity. **Resolved by HQ IA 2006 review of 3 Districts' IA.**

- 3. The State needs to develop a procedure to have the Central materials laboratory review test procedures and equipment in District laboratories. **Partially Resolved – METS staff calibrates all large equipment and reviews maintenance records and procedures in all District and Local Agency laboratories, but not small equipment.**

**New Observation:** The condition and calibration of small equipment is reviewed by the requirement that each laboratory participate in the RSP Proficiency Testing program outlined in the IA Manual. Each laboratory receives at least 3 samples to test each year, and their results are compared to Caltrans, local agencies, and private laboratories on a statewide basis. Failure to meet the necessary standards of testing within this program is investigated by the METS IA staff in conjunction with the District's laboratory supervisor.

However, METS does not provide a review of the District laboratories' for all test procedures and small equipment calibration. This practice, much like the AMRL review, would make the extension of the Central laboratory's AMRL certification much stronger. And, as has been experienced in other states, will raise the quality of the District laboratories.

**Recommendations:** Caltrans should develop and implement procedures to have METS review all test procedures and equipment in District laboratories.

- 4. Test reports submitted by outside laboratories need to indicate the person testing the material. **Not resolved by the 7 State and 5 Local Agency projects that were reviewed.**

**New Observation:** It is necessary and important that the tester be easily and clearly identified on all test reports.

**Recommendations:** Caltrans should implement that the full name of the tester be identified on all Caltrans' forms. This issue might be resolved by the use of PACRS, which requires an electronic signature for each test submitted.

5. We have concerns that the review of construction projects by District Local Assistance Engineers (off the SHS) are not being performed. **Not resolved by the 4 local assistance projects off the SHS that were reviewed.**

**New Observation:** The current Local Assistance QAP program should be updated to include the following: 1) 5 out of 5 Local Agencies had Certificates of Proficiency; 2) 4 out of 5 Local Agencies reviewed were not keeping project files updated and available for review in one central location; 3) 5 out of 5 Local Agencies reviewed were not keeping Independent Assurance staff and lab/equipment separate from the regular day to day acceptance testing; 4) 5 out of 5 Local Agencies reviewed were not keeping Log summary testing frequency information available upon request; and 5) 2 out of 5 Local Agencies reviewed were not keeping "Certificate of Proficiency" certifications readily available.

**Recommendations:** Caltrans' Local Assistance should develop and implement a revised Quality Assurance Program (QAP), provide training, and perform construction monitoring of local agency projects on the NHS.

6. The State should add some additional corroborative testing to the IA program. **Not resolved by the State and Local Assistance manuals.**

**New Observation:** The IA now performs corroboration tests at annual intervals for CTMs of Sieve Analysis (CT 202), Sand Equivalent (CT 217), and Cleanness Value (CT 227) – three of the basic soils and aggregate tests.

**Recommendations:** Caltrans should develop and implement an action plan for further corroboration test methods for Hot Mix Asphalt would be Sampling (CT 125), Portland Cement Concrete Air Content (CT 504), Unit Weight (CT 518), and Penetration (CT 533) are the minimum tests.

## **VII. ADDITIONAL FINDINGS/OBSERVATIONS AND RECOMMENDATIONS**

The following finding and resulting recommendations were made as a result of the QA Process Review Follow-up.

1. **Finding:** Currently, the FHWA California Division Office is not receiving the Final Materials Certification (FMC) form on a regular basis for Federal-aid projects on the NHS.

**Recommendation:** Caltrans should develop and implement an action plan to create a Final Materials Certification (FMC) form, which will then comply with the 23 CFR 637.207 requirements. The Local Assistance Procedures Manual should be revised to require a copy of the Materials Certificate (Exhibit 17-G) be routed to the FHWA California Division for projects on the NHS.

The FMC form will certify the results of quality assurance testing of the specifications, material and assurance testing personnel, and equipment used on a project. Note. See Appendix I for example of a log summary testing frequency table. Also it applies to Local agencies with projects on the NHS. For Local Agency projects off the NHS, a “Material Certificate”, which is not submitted to FHWA, is included as Exhibit 17-G in the LAPM for Local Agencies to complete.

The following observations and resulting recommendations were made as a result of the QA Process Review Follow-up.

1. **Observation:** In the 2006 Standard Specifications, Caltrans’ officially changed from metric to English units. However, it appears that many if not all of the CTMs are still in metric units.

**Recommendation:** Caltrans needs to revise its CTMs to English units as appropriate.

2. **New Observation:** QC/QA specifications require that the Contractor submit copies of their tests within 24 hours of completion for review by the Engineer. This process will be enhanced by the use of a new web-based Pavement Asphalt Concrete Record System (PACRS) program that will provide both the Contractor and Engineer a tool for recording and reviewing test results against the specifications and testing requirements.

**Recommendation:** Insure the implementation of PACRS for all QC/QA projects to assist in timely reporting of test results.

3. **Observation:** Beginning with projects bid in 2007, Caltrans’ QC/QA projects are anticipated to be administered with the assistance of PACRS. This web-based program will give both the Engineer and the contractor “real time” access to data. The data will be entered by engineer (verification) and contractor (quality control), and the analysis for quality factors, verification, and pay will be performed immediately.

**Recommendation:** It is suggested that Caltrans provide the California Division Office with updated information on the PACRS development and how it will enhance the implementation process.

4. **Observation:** Consideration should be given to increase the resources to District 10 due to its inadequate certification filing system. Also, to avoid a conflict of interest, District 7 needs to have a separate laboratory to run its IA program.

**Recommendation:** Caltrans should increase resources in District 10 and 7 for IA.

5. **Observation:** In 2006, METS reviewed 3 Districts' IA and certification programs with 2 primary objectives: 1) Compliance with IA policy and procedures, and 2) Uniformity statewide. The Districts with deficiencies were notified of their deficiencies, and changes were made to bring them into compliance.

The remaining Districts will be reviewed in 2007 and 2008.

**Recommendation:** All 12 Districts should be reviewed on a yearly basis. If Caltrans resources at METS are an issue, they could have the District Laboratories' AASHTO Accredited. A number of States have done this including Florida, Nevada, Virginia, and Minnesota.

6. **Observation:** Currently, the FHWA California Division Office is not receiving the Project Certification Memorandum on a regular basis for Federal-aid projects on the NHS.

**Recommendation:** Caltrans should identify that a Project Certification Memorandum shall be generated for each construction.

(*Construction Manual*, Example 6-1.1). For any material in which a change order is written to accept out of specification material, that material is to be added to the certification as an exception. For Local Agency projects off the NHS, a "PS&E Certification", Exhibit 12-C in the LAPM, is completed and submitted to the DLAE when requested "Authorization of Construction".

7. **Observation:** From interviewing headquarters IA staff and the five District IA staff, they rated the existing written examination as "satisfactory" and "needs to be improved."

**Recommendation:** Caltrans should develop and implement an action plan to improve the existing tester qualification written examinations.

By creating a tracking mechanism, one can evaluate written tests on a yearly basis (see Appendix H). This could also apply to Local agencies as well (for projects on the NHS).

## VIII. CONCLUSION

Overall, the Team found that Caltrans has not adequately addressed 9 of the 21 issues raised in the 2004 review.

Furthermore, we found that there is two new finding and 7 new concerns. These concerns will be challenges to be faced by the local agencies as well. Overall Local Program Agency administered projects are carried out in accordance with Federal requirements, however recommendations are included for Local Agencies to improve their QAPs. We recommend that State and Local Agencies start taking actions on the identified findings and recommendations to improve their QAPs.

Caltrans and Local Assistance will be provided a copy of this report. Pending the corrective actions and the response, another review may be necessary.

## **IX. ACKNOWLEDGEMENTS**

The Federal Highway California Division Office greatly appreciates the participation, courtesy, and assistance provided by Caltrans' METS, Construction, and Local Assistance staff during our visits and in completing this review.

## **X. APPENDICES**

- A. Work Plan for Process Review on Quality Assurance
- B. 2004 Quality Assurance Review
- C. Master List of Caltrans Qualified Testers
- D. Master List of Caltrans Qualified Laboratories
- E. Certificates of Proficiency
- F. Certificates of Proficiency for Structures Construction
- G. Rating Scale
- H. Practicals New, Recertifications, and Administered Examinations
- I. Log Summary Testing Frequency (example)



## Appendix A – Work Plan for Process Review on Quality Assurance

### FEDERAL HIGHWAY ADMINISTRATION CALIFORNIA DIVISION

Process Review on Quality Assurance Program (Follow-up)  
Review Work Plan / Scope Statement  
(S49904)

#### OBJECTIVE/PURPOSE

Through Risk Analysis, the California Division of the Federal Highway Administration (FHWA) has identified construction materials quality to be one of its highest risks, particularly in light of the findings of recent Quality Control Quality/Quality Assurance (QC/QA) national reviews and limited oversight for transportation projects.

The Quality Assurance procedures for construction are structured around 23 CFR 637. The overall purpose of these procedures is to assure the quality of materials and construction in all Federal-aid highway projects by Caltrans or a local agency.

The purpose of this process review is to evaluate the effectiveness of Caltrans' implementation of findings and recommendations of a July 8, 2004 memorandum signed by the FHWA Division Office Construction and Materials engineer (Attachment A) that directed a follow-up meeting or letter from Caltrans that addresses whether any of the recommendations have been considered or implemented. Thus, a meeting took place in October 2004, which Caltrans agreed they would in time implement these recommendations; however, with them recently reinitiating their Reference Sampling Program (RSP) and updating their QC/QA and standard specifications, it will take some time to implement all of them. On March 2006, they hired a new independent assurance manager to run the RSP program and things seem to be improving.

Essentially, this process shall review:

- Verify the following QC/QA improvements:
  - a. Setting the maximum size of a lot to 20 contractor test results
  - b. Revising the ratio of State tests used for verification to approximately 1 in 5
  - c. If a State procedure has been developed to direct construction personnel to monitor contractor QC testing procedures and documentation
  - d. Procedures for verifying contractor test results needs to be revised to ensure that AC pay is run after each State verification test is run.
  - e. The specification should be revised to direct the contractor to amend the QC plan to incorporate updated tester certificates.
  - f. The State should consider developing training for the QC/QA.
  - g. Consideration should be given to METS providing increased oversight and training of the District QC/QA Coordinators to provide uniform application of the specifications between Districts.
- Verify if the distribution of list of certified testers are properly filled in project records.
- Confirm construction projects by district local assistance are being reviewed on a consistent basis.

- Validate test reports submitted by outside laboratories need to indicate the person testing the material.
- Review whether the State has developed procedures to have the Central materials laboratory review test procedures and equipment in District laboratories.
- Verify if the State has developed policy and procedures for frequency for retesting the written portion of the certification program and decertification procedures.
- Corroborate that the structural testers need to be instructed on the requirements for certification.

A report will be prepared documenting the team's findings and, if necessary, recommendations to improve processes and better ensure full quality assurance measures.

### **SCOPE/APPROACH**

During the course of this evaluation, the team will explore whether proper implementation of quality assurance measures were conducted. The scope consists of evaluating the 2004 findings and reviewing Caltrans and local agencies processes, administration, activities and control of the quality assurance procedures through site visits to verify that Caltrans is meeting those commitments. These site visits will be closely coordinated with Caltrans and will include interviews with appropriate district and headquarters personnel. It is anticipated that besides reviewing the States central lab at least three District labs (including three local agencies) will be visited.

This process review will examine the certified testers, qualified labs, reference sampling program, acceptance testing, material certification, etc.

### **RESPONSIBILITIES**

A multi-discipline team with representation from FHWA – California Division and Caltrans will conduct this review. Team members and others with applicable expertise will assist on an “as needed” basis. The basic team is identified below.

#### **FHWA-CA**

- Jason Dietz – Construction/Materials Engineer & Field Operations Engineer ( Central Region)
- Bren I. George – Field Operations Engineer (Dist. 7 & 8)

#### **Caltrans**

- State side -- TBD
- Local Assistance – Eugene Shy, Donald Roberts

### **TRAVEL**

It is anticipated that the team will need to travel to Southern California (Districts 8, and 11), Central Region (District 10), and North Region (District 4, and 3). In order to review files, documentation, and interview Caltrans's staff, it is likely that the team will

need at least one night accommodation in each location. Therefore, travel costs for the FHWA team are expected to be \$3,500.

**SCHEDULE/MILESTONES**

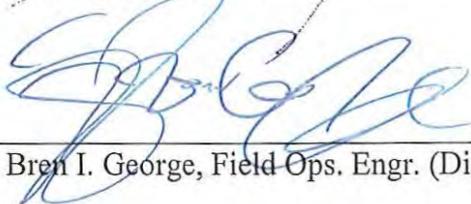
<b>TIMELINES</b>	<b>MILESTONES</b>
December 2006	Final work plan approved
January 2007	Identify Caltrans and Local Assistance team members
February-March 2007	Conduct site visits, interviews, etc.
April – May 2007	Review and analyze data. Prepare Draft Report
May 1, 2007	Complete Draft Report. Circulate for management review
June 1, 2007	Circulate Final Draft Report for Signature
June 15, 2007	Conduct "Closeout" Conference
July 2, 2007	Issue and distribute final signed report

**RECOMMENDATIONS/APPROVAL**

Recommendation:

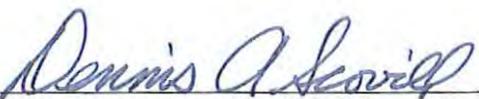
  
\_\_\_\_\_  
Jason Dietz, Construction/Materials Engr.

Date: 1/25/2007

  
\_\_\_\_\_  
Bren I. George, Field Ops. Engr. (Dist. 7 & 8)

Date: 1/25/07

Approval:

  
\_\_\_\_\_  
Dennis A. Scovill, Chief Operating Officer

Date: 1/30/07

## Appendix B – 2004 Quality Assurance Review

### Quality Assurance review of the California Department of Transportation (S45405)

Review performed: January 12, 2004 thru January 16, 2004

Report by: Michael Rafalowski

FHWA Contacts: John Dewar, Director Field Operations  
Dennis Dvorak, Materials Engineer, Kansas Division Office  
Jason Dietz, California Division Office

California DOT Contacts:

Headquarters,  
Phil Stolarski, Materials Engineering and Testing Services; Terrie Bressette, Flexible Pavement Materials; Agustin Perez, Construction; Chuck Suszko, Construction; Albert Vasquez, Flexible Pavement Materials; Sam Kianfar, Flexible Pavement Materials; Liza Valencia, IA; Ebi Fini, Nahid Hosseinazadeh, Eugene Shy, Local Assistance Engineer.

District 12, Orange County,  
Behdad Baseghi, District Materials Engineer; Ashley Shaw, IA; John Warrick, IA; Farhad Hadjibaie; Mehرداد Mahdavian; T.H. Wang; Randy Reichert, assoc. M&R Engr.; Homa Nouri, Local assistance Engineer; Bill Gilchrist, Resident Engineer.

District 7, Los Angeles ,  
Gerardo Medina; Roberto Jarquin, IA; Arnie Ehteman; Eric Samaniego; Eric Collar, IA; Terry Chapinan, IA; Ron Longazo, IA; Patricia Galvan, Resident Engineer.

District 6, Fresno,  
Ron Sekhon, Materials Engineer; Kirit Dave, IA; Kevin Reisz, Resident Engineer; Tod George, Construction Engineer; Fayad Al Masri, District Local assistance Engineer; Marv Johnson, District Local assistance Engineer.

### Scope

The objective of this assessment and information sharing will be to review the State Agencies' Quality Assurance Program practices and procedures, and to ascertain the status of the States' implementation of the Quality Assurance regulation. The review will be looking at the entire Quality Assurance Program in the State with an emphasis on the use of Contractor QC test data in the Agency acceptance decision.

Material practices involving the regulation were examined at the State Headquarters, district and project levels. Three districts, District 6, Fresno; District 7, Los Angeles, and District 12, Orange County, and a total of 6 projects were reviewed.

## **Itinerary**

January 12 – District 12 meeting; January 13 - project reviews in District 12, District 7 meeting; January 13 - project reviews in District 7, January 14 – District 6 meeting, project reviews in District 6; January 15 Central Lab meeting and closeout.

## **Organizational Structure**

The Materials function is located in Materials Engineering and Testing Services (METS) which is in the Engineering Services Division. There are 12 districts in California. There are different organizational structures in the Districts as it relates to materials. There is a single Materials engineer that covers Districts 5 and 6. In District 7 there are 5 leaders not one of which is the “district materials engineer” and District 12 and the remaining districts which have a District Materials Engineer.

The METS has quarterly meetings with the District Materials Engineers.

## **Quality Assurance program**

The sampling and testing frequency guides for normal acceptance projects appear in the Chapter 6 of the State Construction Manual and some of the standard specifications.

The Independent Assurance Program is covered in a separate publication the “Independent Assurance Program Manual”, dated January 2001. This manual also covers the technician certification program, the laboratory qualification program and the equipment calibration procedures.

The State’s Quality Assurance procedures for asphalt are outlined in the publication “Quality Control Quality Assurance Manual” and the special provisions.

## **Technician Qualification Program**

The METS is responsible for the overall administration of the IA program. The District IA testers are certified by the METS certification program. At the local level, the Independent Assurance (IA) testers in each of the Districts administer the State’s technician certification program. The certification program includes a proficiency portion and a written test for each test that a technician is certified in. A certification is good for one year. The recertification process includes a proficiency test for each test that a technician is certified in. The following tests are performed on collaborative samples sieve analysis, sand equivalent, and cleanliness. The IA testers witness the remaining tests.

Each District keeps a list of qualified technicians. A technician working for a private laboratory cannot be qualified unless they work for a qualified laboratory. The State is working on a statewide list.

The list of qualified technicians is not always getting into the project files. Also information on technicians that were qualified in other districts is also not readily available to project personnel.

District 6 has developed some training aids for materials technicians that are very good.

It was noted that at least in one district there was a problem in having the structural testers recertified.

The current policy does not have a procedure for disqualifying technicians.

There currently is no requirement for retaking the written part of the test for recertification.

### **Laboratory Qualification**

The Central laboratory in Sacramento is AASHTO accredited.

The State has district laboratories in all but one district (District 12, which covers Orange County). The district laboratories have the capability of performing gradations, R-value, PI, compression testing, ignition ovens and asphalt mixture tests. The State does not have a laboratory qualification program for the district laboratories.

The laboratory qualification program is outlined in chapter 5 of the Independent Assurance Program. The Independent assurance testers in each District are responsible for qualifying labs within the geographical area of the District. Each lab is required to develop and maintain a Quality manual. The District IA staff also inspects the laboratories. All laboratories are required to participate in the reference sample program in order to become and maintain qualification. Each District keeps a list of qualified laboratories for the laboratories within the geographical area of the District. If a District uses a laboratory located within another District, the District needs to contact the District that would qualify the laboratory in order to insure that they were qualified. The lab qualification process must be renewed yearly.

The State has recently restarted their reference sample program. This program is critical for ensuring the competence of laboratories.

### **Equipment Calibration**

The procedures for calibrating and documenting calibration are in Chapter 7 of the Independent Assurance Program Manual.

The State calibrates the stabilometers and nuclear gauges for their use. Scales and compression machines are calibrated by outside vendors.

All testing equipment whether it is State owned or private laboratory owned is required to have a label indicating the due date for calibration.

### **Quality Control Program**

The State uses contractor tests in the acceptance decision on asphalt paving projects that have over 10,000 tons of mix. The State requires Quality Control plans for asphalt projects that use contractor tests in the acceptance decision.

The requirements for quality control plans are contained in the publication "Quality Control Quality Assurance Manual," dated June 2002.

The Contractor is required to submit QC plans to the State for approval.

There currently are no requirements for the contractor to update his quality control program when technicians are recertified or the laboratories are requalified.

### **Independent Assurance Program**

The Independent Assurance Program is contained in the publication, "Independent Assurance Program Manual", dated January 2001.

The Flexible Pavement Materials section in METS manages the IA program. The Independent Assurance testers are qualified by METS. The Independent Assurance testers operate out of the District offices.

The Independent Assurance Program includes the reference sample program, collaborative testing, and witnessing of test procedures.

The State's Independent Assurance testing is based on the system approach. The IA program covers contractor, consultant, State and local personnel. All testers are witnessed for the tests that they perform once a year. Collaborative testing, which is performed on fabricated samples, are performed once a year on sieve analysis, sand equivalent and cleanliness values.

In addition to the traditional functions for IA, the IA testers in the Districts are used to qualify testers and laboratories.

In District 6 it was noted that the IA tester was covering 190 testers and 25 laboratories and completed 2,698 written and practical tests during 2003.

In the system approach annual reports are a critical aspect of monitoring the overall effectiveness of the IA program.

### **Hot Mix Asphalt**

The State specifies asphalt binder using the AR grading system and specifies asphalt mix design using the California kneading compactor.

The State uses QC/QA procedures on projects, which have over 10,000 tons of mix. On QC/QA projects the contractor is required to perform a mix design and it is verified by the State. The asphalt content for mix design is determined on stability and voids. The verification process is performed in the district laboratories. In addition, the mix properties are also verified by the State on mix from initial production. A density test strip is also constructed during initial production.

The total quantity of material placed on a project is considered a lot. There are no limits on the size of lots. Contractor quality control tests are taken every 500 tonnes. The State performs the testing at a rate of 1 test per 10 contractor tests on samples taken independently of the contractor's quality control tests. Verification is based on the *t* test and is performed by a program called AC Pay. A dispute resolution system is in place. If the contractor and State cannot resolve the differences a third party is used.

Pay is based on asphalt content, gradation, mix moisture, and compaction. Gradations are based on cold feeds; asphalt content is determined from the ignition oven. A percent-within-limits type specification is used to determine a composite pay factor. The validated contractor's test results are used to determine pay.

Mat density testing is performed with nuclear density gauges. All gauges that are used for acceptance must be correlated with a test strip.

The State currently does not observe contractor testing or examine contractor source documentation. There currently is no requirement for the contractor to retain source documentation.

It was noted that some test reports that were being submitted by the contractors do not indicate the person that was testing the material.

## **Portland Cement Concrete**

### **Aggregate quality testing**

Quality testing for concrete aggregate include LA abrasion, cleanliness, soundness, freeze-thaw testing Alkali-Silica Reactivity and sand equivalent.

### **Mix Design**

Mix designs are developed and submitted by the contractor. Trial batches are performed by the contractor and must be witnessed by State personnel. The State currently requires that fly ash be used in all concrete due to concerns over alkali silica reactivity.

## **Structural Concrete**

Acceptance is based on compressive strength, air content, yield, and penetration ball performed by the State. The smoothness of the decks is determined with a bridge profilograph.

## **Paving concrete**

Acceptance is based on beams, air content, yield, penetration ball and thickness performed by the State. Thickness is measured by cores taken and tested by the State. Ride is also tested using the California profilograph. The profilograph testing is performed by the contractor in the presence of the engineer.

## **Soils**

Structural fill density is placed in 8inch lifts. Density is based on 95% of modified proctor. Density in the field is determined by nuclear gages.

## **Aggregate**

Aggregates that are used for bases and sub bases are tested for gradation, R-value, sand equivalent and durability index.

## **Manufactured Materials**

The State approves a number of products on a qualified products list that is published on the State's web site.

## **Computer Programs**

The State uses a computer program, AC Pay, to validate contractor's test results.

## **Findings and Recommendations**

1. Overall the States Quality Assurance program meets the requirements of 23 CFR 637.
2. The start of the RSP program is good. It strengthens the laboratory accreditation program as a means to show the quality of laboratories test reports.
3. The DME meetings are good.
4. The QC/QA program is one of the few in the country that uses an appropriate statistical process to verify contractor test results. However, several improvements to the program should be examined:
  - a. Consideration should be given to setting the maximum size of a lot to 20 contractor test results at least for verification purposes.

- b. The State should consider revising the ratio of State tests used for verification to approximately 1 in 5.
  - c. A State procedure should be developed to direct State construction personnel to monitor contractor QC testing procedures and documentation.
  - d. The procedure for verifying contractor test results needs to be revised to ensure that AC pay is run after each State verification test is run.
  - e. The specification should be revised to ensure that the contractor retains records for 3 years
  - f. The specification should be revised to direct the contractor to amend the QC plan to incorporate updated tester certificates.
  - g. The State should consider running gradations on the aggregate obtained from the ignition oven.
  - h. The State should consider developing training for the QC/QA specification.
  - i. Consideration should be given to METS providing increased oversight and training of the District QC/QA Coordinators to provide a uniform application of the specification between Districts.
  - j. In the long term the State should move toward using volumetrics for asphalt acceptance replacing gradation. This will address concerns with contractor adjustments to asphalt content in the mix.
5. The State should be commended for the development of the tester certification program.
- a. The Districts that have been reviewed have good tracking systems for certified testers. The State should be commended for the work that has been done to develop a statewide database, however, it needs to be completed and implemented.
  - b. The State should be commended for the training that was developed for tester certification in District 6 and are encouraged to develop more.
  - c. The structural testers need to be instructed on the requirements for certification.
  - d. Procedures need to be revised to ensure proper distribution of lists of certified testers and proper filing in project records.
  - e. Consideration should be given to increase the resources in District 6 IA.
  - f. The State should develop a frequency for retesting the written portion of the certification program.
  - g. The State should expand policy and procedures for the overall certification program to cover decertification procedures.
  - h. METS should review the IA certification program performed in the districts to promote uniformity.
6. The State needs to develop a procedure to have the Central materials laboratory to review test procedures and equipment in District laboratories.
7. Test reports submitted by outside laboratories need to indicate the person testing the material.
8. We have concerns that the review of construction projects by district local assistance may not be performed on a consistent basis.
9. The State should add some additional collaborative testing to the IA program.





Appendix E – Certificate of Proficiency

TL-0111 (Rev. 07-00)

CALIFORNIA DEPARTMENT OF TRANSPORTATION



Presents this

CERTIFICATE OF PROFICIENCY

to

Robert Shipman  
Kleinfelder-Sacramento

who is qualified to perform the following tests:

EXPIRES

216 Relative Compaction, Soils & Aggregates	January 19, 2008
231 Relative Compaction of Soils & Aggregates (Nuclear)	January 19, 2008
226 Determination of Moisture Content by Oven Drying	January 19, 2008
504 Air Content, Freshly Mixed Concrete, Pressure	January 19, 2008
518 Density of Fresh Concrete	January 19, 2008
533 Ball Penetration in Fresh Portland Cement Concrete	January 19, 2008
539 Sampling Freshly Mixed Concrete	January 19, 2008
540 PCC Cylinder Fabrication	January 19, 2008
543 Air Content of Freshly Mixed Concrete -Volumetric Method	January 19, 2008
556 Slump of Fresh Portland Cement Concrete	January 19, 2008
557 Temperature of Freshley Mixed Portland Cement Concrete	January 19, 2008
375 In-Place Density & Relative Compaction, AC Pavement	January 19, 2008

for: Dave Dhillon PE District 10 Materials Eng.

by:

Robert B. Rogers

TL-0111 Issued : 19 January 2007

IA Phone No. : (209) 481-5248

Certified Independent Assurance

IA Certificate No. : #054

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

CALIFORNIA DEPARTMENT OF TRANSPORTATION

**CERTIFICATE OF PROFICIENCY**  
for an **ACCEPTANCE TESTER**

*This certifies that*

**Richard Ashbaugh**

(Print name)

**Fugro West**

(Print agency)

**is qualified to perform the following tests:**

<u>Calif. Test Method</u>	<u>Cert. Date</u>	<u>Recert. Date</u>
<input checked="" type="checkbox"/> 105-Calculations	7/06	7/07
<input checked="" type="checkbox"/> 125-Sampling (AC Only)	4/07	4/08
<input checked="" type="checkbox"/> 201-Sampling	7/06	7/07
<input checked="" type="checkbox"/> 202-Sieve Analysis	7/06	7/07
<input checked="" type="checkbox"/> 216-Relative Compaction(Soils)	4/07	4/08
<input checked="" type="checkbox"/> 217-Sand Equivalent	7/06	7/07
<input checked="" type="checkbox"/> 226-Moisture Content	4/07	4/08
<input checked="" type="checkbox"/> 227-Cleanness Value	4/07	4/08
<input type="checkbox"/> 205-Crushed Particle		
<input checked="" type="checkbox"/> 231-Relative Compaction(Soil)	4/07	4/08
<input type="checkbox"/> 229- Durability		
<input checked="" type="checkbox"/> 375-Relative Compaction (AC)	4/07	4/08

<u>Calif. Test Method</u>	<u>Cert. Date</u>	<u>Recert. Date</u>
<input checked="" type="checkbox"/> 504-Air Content(PCC)	4/07	4/08
<input checked="" type="checkbox"/> 518-Unit Weight(PCC)	4/07	4/08
<input checked="" type="checkbox"/> 521-Compressive Strength	4/07	4/08
<input checked="" type="checkbox"/> 533-Ball Penetration(PCC)	4/07	4/08
<input checked="" type="checkbox"/> 539- Sampling	4/07	4/08
<input checked="" type="checkbox"/> 540-Concrete Specimens	4/07	4/08
<input checked="" type="checkbox"/> 523 - Beam Breaking	4/07	4/08

Add: CTM 524 Apr 07

All test methods expire 1 year from date shown

  
Terry L. Stratford / Del S. Courtney

Certified Independent Assurance  
District 3, Marysville, CA

**JOSEPH PETERSON**

District 03 Materials Engineer

# 16 / #80

IAST Certificate No.

D Issue

April 24, 2007

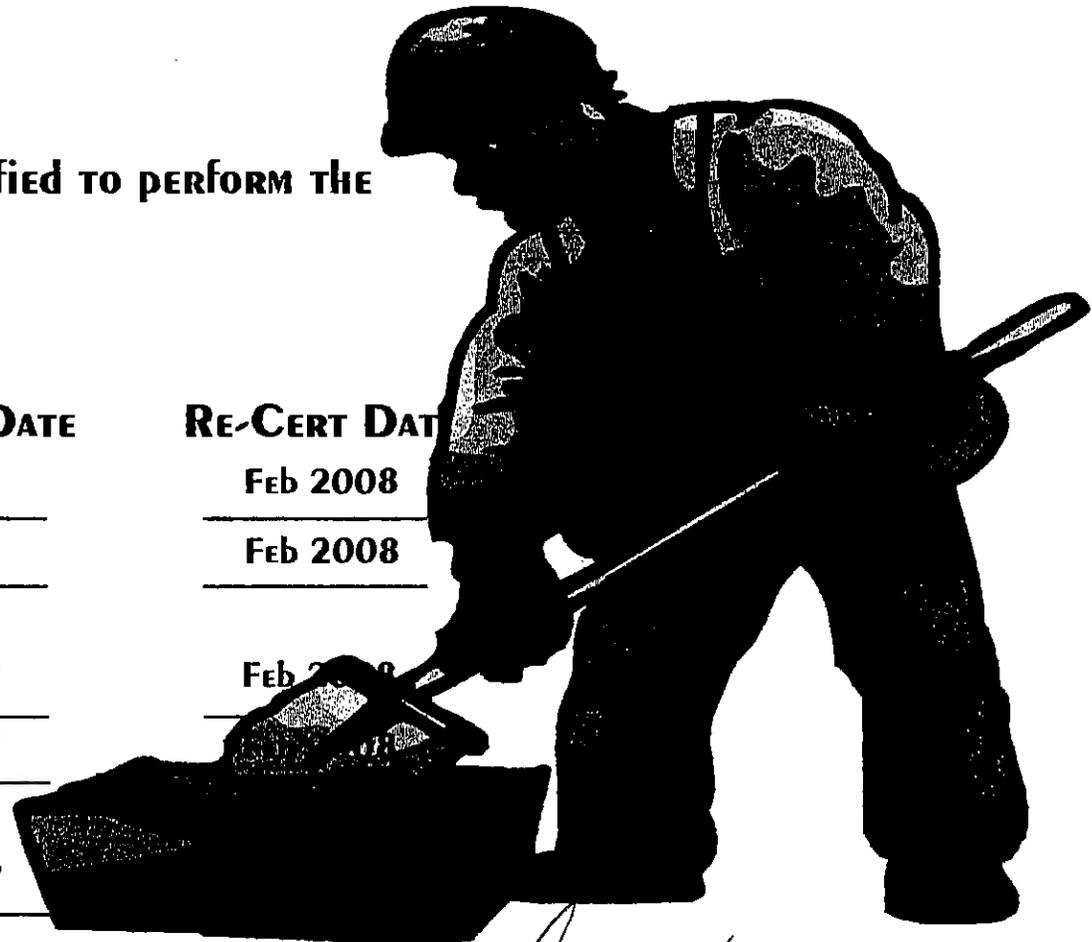
Note: This certificate is valid as long as the Acceptance Tester complies with applicable requirements in Caltrans Quality Assurance Programs Manual.

# CERTIFICATE OF PROFICIENCY

## FOR STRUCTURES CONSTRUCTION

THIS CERTIFIES THAT **MATT CRETE** IS QUALIFIED TO PERFORM THE  
following CTM's

CALIFORNIA TEST METHOD	CERTIFICATE DATE	RE-CERT DATE
✦ 504-AIR CONTENT	Feb 2007	Feb 2008
✦ 518-DENSITY OF FRESH CONCRETE	Feb 2007	Feb 2008
✦ 533-BALL PENETRATION	Feb 2007	Feb 2008
✦ 539-METHOD OF SAMPLING FRESH CONCRETE	Feb 2007	Feb 2008
✦ 540-MAKING, HANDLING STORING SPECIMENS	Feb 2007	Feb 2008
✦ 541-GROUT MIXTURES FLOW CONE	Feb 2007	Feb 2008
✦ 547-OPERATION OF BRIDGE PROFILOGRAPH	Feb 2007	Feb 2008
✦ 556-SLUMP OF PCC	Feb 2007	Feb 2008
✦ 557-TEMPERATURE OF FRESH PCC	Feb 2007	Feb 2008



*Cindy Hicks* FEB 21 2007  
Cindy Hicks Date Issued

Certified Independent Assurance Sampler and Tester

IAST Certificate No. 083

File Copy in Category 39, Materials Testing Certification of Employees. Note: This Certificate is valid as long as the Acceptance Tester complies with applicable requirements in Caltrans IA Program Manual.

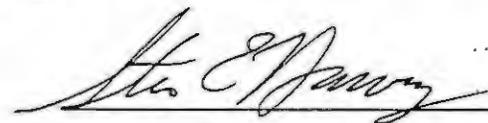
# Certificate of Proficiency

*For Caltrans Structures Construction*

*This Certifies that  
David Clark*

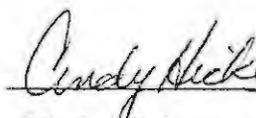
*Is qualified to perform the following tests:*

<u>California Test Method</u>	<u>Certificate Date</u>	<u>Re-Cert Date</u>
504- Air Content PCC	<u>May 2006</u>	<u>May 2007</u>
518-Density of Fresh Concrete	<u>May 2006</u>	<u>May 2007</u>
533-Ball Penetration PCC	<u>May 2006</u>	<u>May 2007</u>
539- Method of Sampling Fresh Concrete	<u>May 2006</u>	<u>May 2007</u>
540-Making, Handling, Storing Specimens	<u>May 2006</u>	<u>May 2007</u>
541-Grout Mixtures (Flow Cone)	<u>May 2006</u>	<u>May 2007</u>
547-Operation of Bridge Profilograph	<u>May 2006</u>	<u>May 2007</u>
556- Slump of Pee	<u>May 2006</u>	<u>May 2007</u>
557- Temperature of Fresh PCC	<u>May 2006</u>	<u>May 2007</u>



**Steve Harvey**

Senior Bridge Engineer



**Cindy Hicks**

Certified Independent Assurance Sampler  
and Tester

Date Issued: FEB 24 2006

IAST Certificate # 083

All test Methods expire 1 year from date shown. File Copy in Category 39, Materials Testing Certification of Employees.

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

Appendix F – Certificate of Proficiency for Structures Construction (Cont.)

## Appendix G - Rating Scale

Rating would be determined as follows:

- 0-2 points: unsatisfactory; a rating of 0 means the program is not active in this area. A rating of 2 would mean minimal some activity in one of the three items.
- 3-4 points: needs improvement; a rating of 3-4 would mean some activity in two of the three items.
- 5-6 points: satisfactory; a rating of 5-6 would mean the program is meeting the expectation of an average service.
- 7-8 point: highly satisfactory; a rating of 7-8 would mean the program is providing very good service to the department.
- 9-10 point: excellent; a rating of 9-10 would mean that the program is extremely committed to the service component mission of the department.

0 means the program is not active in this area.  
2 would mean minimal some activity in one of the three items.

5-6 points: satisfactory; a rating of 5-6 would mean the program is meeting the expectation of an average service.

# Appendix H – Practicals New, Recertifications, and Administered Written Examinations

District 08 Independent Assurance January 01 thru April 27, 2007

Practicals New	Practicals Recert	Writtens	Grand Totals
Total Tests <b>444</b>	Total Tests <b>669</b>	Total Tests <b>998</b>	2111
1 <sup>st</sup> Time Pass <b>430</b>	1st Time Pass <b>649</b>	1st Time Pass <b>679</b>	1758
2 <sup>nd</sup> Time Pass <b>8</b>	2nd Time Pass <b>19</b>	2nd Time Pass <b>93</b>	120
3 <sup>rd</sup> Time Pass <b>0</b>	3rd Time Pass <b>0</b>	3rd Time Pass <b>13</b>	13
4 <sup>th</sup> Time Pass <b>0</b>	4th Time Pass <b>0</b>	4th Time Pass <b>2</b>	2
<b>FAILURES</b>	<b>FAILURES</b>	<b>FAILURES</b>	
1 <sup>st</sup> Time Fail <b>6</b>	1st Time Fail <b>1</b>	1st Time Fail <b>182</b>	189
2 <sup>nd</sup> Time Fail <b>0</b>	2nd Time Fail <b>0</b>	2nd Time Fail <b>20</b>	20
3 <sup>rd</sup> Time Fail <b>0</b>	3rd Time Fail <b>0</b>	3rd Time Fail <b>8</b>	8
4 <sup>th</sup> Time Fail <b>0</b>	4th Time Fail <b>0</b>	4th Time Fail <b>1</b>	1
Check Total 444	Check Total 669	Check Total 998	2111

Total No. of CT Labs Accred.	Total No. of County/City Labs Accred.	Total No. of Private Labs Accred.	Expired	In Process
3	0	12	7	5

Note: Practical exam refers to the practical exam after the initial written exam. Witness refers to the annual requalification of the tester including corroboration.

Total no. of Labs w/ Revoked/Suspended Accred.	Dispute Resolution? (YES/NO and comments?)
0	0

Total no. of Labs w/ Revoked/Suspended Accred.	Dispute Resolution? (YES/NO and comments?)
0	0

STATE ROUTE 4 BYPASS  
SEGMENT 1 / PACKAGE 1

Report No.	Sample No.	Mix No.	Date Cast	Age (days)	Break PSI	CONCRETE COMPRESSIVE STRENGTH		Kelly Ball Pen.	Spec Pen. Req	Mix Temp.	Item No.	Location/Remarks
						Required	Pass/Fail					
49	22182 A	220	06/05/06	7	2850	N/A	N/A	2	2	84	152	Retaining Wall #5, Stage 2 Wall
	22182 B			7	2960							
	22182 C			14	3490							
	22182 D			14	3370							
	22182 E			29	4460							
	22182 F			29	4290							
50	22183 A	556	06/05/06	7	3690	N/A	N/A	1.75	2	83	151	Route 26/99, Pler Wal. @ Bent 2
	22183 B			7	3770							
	22183 C			14	4360							
	22183 D			14	4310							
	22183 E			29	5030							
	22183 F			29	5180							
51	22225 A	272V13	06/08/06	7	2530	N/A	N/A	4	4		146	Sound Wall #2, CIDH Pile
	22225 B			7	2590							
	22225 C			14	3660							
	22225 D			14	3710							
	22225 E			28	4380							
	22225 F			28	4250							
52	22342 A	556	06/21/06	7	3720	N/A	N/A	1.5	2	84	151	Hammer Lane OC, Deck Pour - Stage 1
	22342 B			7	3790							
	22342 C			12	4150							
	22342 D			12	4100							
	22342 E			14	4190							
	22342 F			14	4160							
	22342 G			28	4310							
	22342 H			28	4270							
53	22343 A	556	06/21/06	7	3450	N/A	N/A	2	2	82	151	Hammer Lane OC, Deck Pour - Stage 1
	22343 B			7	3380							
	22343 C			14	4250							
	22343 D			14	3980							
	22343 E			28	4160							
	22343 F			28	4120							
54	22379 A	346	06/19/06	7	3250	N/A	N/A	4.25	4	80	163	Sound Wall #1
	22379 B			7	3160							
	22379 C			28	3840							
	22379 D			28	4180							
	22411 A			7	2840							
55	22411 B	220	06/27/06	7	2800	N/A	N/A	1.75	2	89	157	Sound Wall #1 - Footing
	22411 C			14	3540							
	22411 D			14	3360							
	22411 E			28	3870							
	22411 F			28	3660							
	22592 A			7	3270							
56	22592 B	220	07/12/06	7	3230	N/A	N/A	3	2	82	157	Sound Wall #1 - Footing
	22592 C			14	4380							
	22592 D			14	4300							
	22592 E			28	4970							
	22592 F			28	4910							
	22593 A			7	3290							
57	22593 B	556	07/12/06	7	3450	N/A	N/A	3	2	80	151	Hammer Lane OC - PT Blockouts
	22593 C			14	4460							
	22593 D			14	4580							
	22593 E			28	5070							
	22593 F			28	4930							
	22974 A			7	2650							
58	22974 B	272V13	08/15/06	7	2760	N/A	N/A	1.5	2	80	146	Sound Wall #2, CIDH Pile * Cannot use 28 day data, 1 sample is insufficient. Will wait for 56 day break to make a determination
	22974 C			14	3420							
	22974 D			14	3490							
	22974 E			28	3450							
	22974 F			56	5190							
					4061							

Appendix I – Log Summary Testing Frequency (example)

