Quality Assurance Program (QAP) County of Del Norte

The purpose of this program is to provide assurance that the materials incorporated into the construction projects are in conformance with the contract specifications. This program should be updated every five years or more frequent if there are changes of the testing frequencies or to the tests themselves. To accomplish this purpose, the following terms and definitions will be used:

I. Definition of Terms

- A. Acceptance Testing (AT) Sampling and testing, or inspection, to determine the degree of compliance with contract requirements.
- B. Independent Assurance Program (IAP) Verification that AT is being performed correctly by qualified testers and laboratories.
- C. Quality Assurance Program (QAP) A sampling and testing program that will provide assurance that the materials and workmanship incorporated into the construction project are in conformance with the contract specifications. The main elements of a QAP are the AT, and IAP.
- D. Source Inspection AT of manufactured and prefabricated materials at locations other than the job site, generally at the manufactured location.

II. Materials Laboratory

A. The County will use their own materials laboratory or a private consultant materials laboratory to perform AT on Federal-aid and other designated projects. The materials laboratory shall be under the responsible management of a California registered engineer (Engineer) with experience in sampling, inspection, and testing of construction materials. The Engineer shall certify the results of all tests performed by laboratory personnel under the Engineer's supervision. The materials laboratory shall contain certified test equipment capable of performing the tests conforming to the provisions of this QAP.

The materials laboratory used shall provide documentation that the laboratory complies with the following procedures:

- 1. Correlation Testing Program The materials laboratory shall be a participant in one or more of the following testing programs:
 - a) AASHTO Materials Reference Laboratory (AMRL)
 - b) Cement and Concrete Reference Laboratory (CCRL)
 - c) Caltrans' Reference Samples Program (RSP)

Page 1 of 5

2022 QAP

Date Printed: 3/17/2022

- 2. Certification of Personnel The materials laboratory shall employ personnel who are certified by one or more of the following:
 - a) Caltrans District Materials Engineer
 - b) Nationally recognized non-Caltrans organizations such as the American Concrete Institute, American Asphalt Institute, 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.
- Laboratory and Testing Equipment The materials 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 IAP.

III. Acceptance Testing (AT)

AT will be performed by a materials laboratory certified to perform the required tests. The tests results will be used to ensure that all materials incorporated into the project are in compliance with the contract specifications.

Testing methods will be in accordance with the CT Method or a national recognized standard (i.e., AASHTO ASTM, etc.) as specified in the contract specifications.

Sample locations and frequencies may be in accordance with the contract specifications. If not so specified in the contract specifications, sample shall be taken at the locations and frequencies as shown in Attachment #1 - Sampling and Testing Frequency Table (Exhibit 16-R of the LAPM).

IV. Independent Assurance Program (IAP)

IAP shall be provided by personnel from Caltrans, the County's certified materials laboratory, or consultant's certified materials laboratory. IAP will be used to verify that sampling and testing procedures are being performed properly and that all testing equipment is in good condition and properly calibrated.

IAP personnel shall be certified in all required testing procedures, as part of IAP, and shall not be involved in any aspect of AT.

IAP shall be performed on every type of materials test required for the project. Proficiency tests shall be performed on Sieve Analysis, Sand Equivalent, and Cleanness Value tests. All other types of IAP shall be witness tests.

Page 2 of 5 2022 QAP Date Printed: 3/17/2022 Poor correlation between acceptance tester's results and other test results may indicate probably deficiencies with the acceptance sampling and testing procedures. In cases of unresolved discrepancies, a complete review of AT shall be performed by IAP personnel, or an independent materials laboratory chosen by the County, IAP samples and tests are not to be used for determining compliance with contract requirements. Compliance with contract requirements is determined only by AT.

Reporting Acceptance Testing Results

The following are time period for reporting material test results to the Resident Engineer.

- When the aggregate is sampled at material plants, test results for Sieve Analysis, Sand Equivalent, and Cleanness Value should be submitted to the Resident Engineer within 24 hours after sampling (48 hours if materials testing occurs out of County).
- When materials are sampled at the job site, test results for compaction and maximum density should be submitted to the Resident Engineer within 24 hours after sampling (48 hours if materials testing occurs out of County).
- When soils and aggregates are sampled at the job site:
 - 1. Test results for Sieve Analysis, Sand Equivalent, and Cleanness Value should be submitted to the Resident Engineer within 72 hours after sampling (84 hours if materials testing occurs out of County).
 - 2. Test results for "R" Value and asphalt concrete extraction should be submitted to the Resident Engineer within 96 hours after sampling (108 hours if materials testing occurs out of County).

When sampling products such as Portland Cement Concrete (PCC), cement-treated base (CTB), hot mix asphalt (HMA), and other such materials; the time of such sampling shall be varied with respect to the time of the day insofar as possible, in order to avoid a predictable sampling routine. The reporting of AT results, if not performed by the Resident Engineer's staff, shall be done on an expedited basis such as by email or telephone.

VI. Testing of Manufactured Materials

During the design phase of the project, the Project Engineer may submit a "Source Inspection Request" to the County, consultant, or Caltrans for inspection and testing of manufactured and prefabricated materials by their materials laboratory, for an example see Attachment #2 - Source Inspection Request to TransLab (Exhibit 16-W of the LAPM). A list of materials that can be typically accepted on the basis of certificates of compliance during construction is found in Attachment #3 - Construction Materials Accepted by a Certificate of Compliance (Appendix F of the QAP Manual). All certificates of compliance shall conform to the requirements of the contract

2022 OAP Page 3 of 5 Date Printed: 3/17/2022 specifications, for examples see Attachment #4 - Vendor's Certificate of Compliance or Certificate of Compliance for Portland Cement (Appendix J.1 and J.2 of the QAP Manual).

Should the County request Caltrans to conduct the source inspection, and the request is accepted, all sampling, testing, and acceptance of manufactured and prefabricated materials will be performed by Caltrans' Office of Materials Engineering and Testing Services.

For Federal-aid projects on the National Highway System (NHS), Caltrans will assist in certifying the materials laboratory, and the acceptance samplers and testers. For Federal-aid projects off the NHS, Caltrans may be able to assist in certifying the materials laboratory, and the acceptance samplers and testers.

VII. Project Certification

Upon completion of a Federal-aid project, a "Materials Certificate" shall be completed by the Resident Engineer. The County shall include a "Materials Certificate" in the Report of Expenditures submitted to the Caltrans District Director, Attention: District Local Assistance Engineer. A copy of the "Materials Certificate" shall also be included in the County's construction records. The Resident Engineer in charge of the construction function for the County shall sign the certificate. All materials incorporated in to the work which did not conform to specifications must be explained and justified on the "Materials Certification," including changes by virtue of contract change orders, See Attachment #5 – Examples of Materials Certificates/Exceptions (Appendix K of the OAP Manual).

VIII. Records

All material records of samples and tests, material releases, and certificates of compliance for the construction project shall be incorporated into the Resident Engineer's project file. If a Federal-aid project:

- Α. The files shall be organized as described in Section 16.8 "Project Files" of the Local Assistance Procedures Manual.
- It is recommended that the complete project file be available at a single location for inspection by Caltrans and Federal Highway Administration (FHWA) personnel.
- C. The project files shall be available for at least three years following the date of final project voucher.
- The use of "Log Summary," similar to Attachment #6 Example of a Log Summary Sheet (Appendix H of the QAP Manual), facilitates reviews of material sampling and testing by Caltrans and FHWA, and assists the Resident Engineer in tracking the frequency of testing.

Page 4 of 5 2022 QAP Date Printed: 3/17/2022 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 test for each project; however, copies o^{-} the test reports are to be provided for each of the projects to complete the records.

Approved by:

James Barnts County Engineer



Date Printed: 3/17/2022

Attachment #1

Sampling and Testing Frequency Table

(Exhibit 16-R of the LAPM)

2022 QAP Attachment Date Printed: 3/17/2022

Exhibit 16-R Sampling and Testing Frequency Table

for projects OFF the SHS

Sample for Local Agency QAPs

Sampling and Testing Frequency Table for projects OFF the SHS.

HOT MIX ASPHALT (HMA) / ASPHALT CONCRETE (AC)

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling	
Aggregate Gradation (Sieve)	CT 202	4.D. 4000 T	At Plant Per CT 125 (a)	
Sand Equivalent	CT 217	1 Per 1000 Tons or Part Thereof; Minimum 1 per day during production/placement of at least 300 tons per day.		
Asphalt Binder Content	CT 382	production/placement of at least 500 tons per day.	Loose Mix Behind Paver Per CT 125	
In-Place Density and Relative Compaction (Nuclear)	Nuclear (b) CT 375 or ASTM D2950 (c	1 Per 1000 Tons or Part Thereof; Minimum 1 per day during production/placement of at least 300 tons per day. (b)	Random Locations Per CT 375 (c	
Theoretical Maximum Specific Gravity and Density (Rice)	СТ 309		Loose Mix Behind Paver Per CT 125	
HMA Moisture Content	CT 226 or CT 370	1 Per Day During Production/Placement of At Least 300 Tons Per Day		
Stabilometer Value (d)	CT 366			
Asphalt Binder	Sample per Section 92	Sample 1 min. per day for production over 300 tons per day; See (f) regarding testing.	At Plant Per CT 125	
Smoothness	12-foot Straightedge	As necessary to confirm contract compliance.	Final Pavement Surface	

- (a) Exact tonnage of sample location to be determined by Random Sampling Plans
- (b) Compaction determined by Neclear Density Device. Core testing required if compaction fails the neclear test
- $\begin{tabular}{ll} \textbf{(c)} & \textbf{Correlation between core densities and nuclear device required only if compaction fails the nuclear test} \end{tabular}$
- (d) Report the average of 3 tested briquettes from a single split source
- (e) Use CT 309 to determine maximum theoretical density in lieu of CT 367 calculated maximum theoretical density
- $(f) \ \ No\ testing\ required\ unless\ warranted\ by\ concern\ ; sample\ and\ store\ until\ completion\ of\ project$

SUBGRADE (DISTURBED BASEMENT SOIL) OR EMBANKMENT

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Maximum Density and Relative Compaction	CT 216/CT 231	1 Min. Test per 5000 sq ft under vehicle traveled way and shoulder 1 Min. Test Per 300 linear foot under sidewalk	Random locations as determined by the Engineer in place after compaction.

AGGREGATE BASES AND SUBBASES, IMPORTED BORROW

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling	
Sieve Analysis	CT 202			
R-Value	CT 301	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement.	
Sand Equivalent	CT 217		to placement.	
Maximum Density and Relative Compaction	CT 216/CT 231	1 Min. Test per 5000 sq ft	Random locations as determined by the Engineer in place after compaction.	

STRUCTURE BACKFILL, SELECT BACKFILL

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling	
Sieve Analysis	CT 202			
R-Value	CT 301	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement	
Sand Equivalent	CT 217		to placement	
Maximum Density and Relative Compaction	СТ 216/СТ 231	1 Min. Test Per 2 Vertical Lifts of Placement	Random locations as determined by the Engineer in place after compaction.	

PORTLAND CEMENT CONCRETE (PCC) - STRUCTURAL AND SIGNAL/LIGHTING FOUNDATIONS

COARSE AGGREGATE			
Quality Characteristic	Test Method		
Sieve Analysis	CT 202	1 min. test per 500 cu yds and per each material source ; 1 min. test on	Sample from site stockpile/plant prior
Cleanness Value	CT 227	smaller projects; If bridge, 1 min. set per separate pour per abutment/pier/deck.	to placement

FINE AGGREGATE			
Quality Characteristic	Test Method		
Sieve Analysis	CT 202	1 min. test per 500 cu yds and per each material source ; 1 min. test on	Sample from site stockpile/plant prior
Sand Equivalent	CT 217	smaller projects; If bridge, 1 min. set per separate pour per abutment/pier/deck.	to placement

WET MIX			
Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Slump/Penetration	CT 533	2 per day	
Cylinders	CT 539/540	1 min. set of 3 per day; If bridge, 1 min. set per separate pour of abutment/pier/deck.	Sample from truck/work site

Source Inspection Request to TransLab

(Exhibit 16-W of the LAPM)

SAMPLE COVER MEMO SOURCE INSPECTION REQUEST FROM LOCAL AGENCY'S RESIDENT ENGINEER TO CALTRANS' OFFICE OF MATERIALS ENGINEERING AND TESTING SERVICES

(Prepared by Applicant on Applicant Letterhead)

To: Office of Materials Engineering & Testing Services, MS #5 California Department of Transportation 5900 Folsom Blvd. Sacramento, CA 95819	Date:
EA:	
Project Number: Project Description:	
Subject: (
	pection (reimbursed) services for the above-mentioned on for this service from our district Local Assistance from District Local Assistance Engineer.
Please find the following documents enclosed as req	quired:
1. Completed CEM-3101	
2. One set of PS&E	
Any question you might have about the materials, to:, at,	
(Applicant Representative Name)	
(Title)	
(Local agency, name & address)	

Construction Materials Accepted by a Certificate of Compliance (Appendix F of the QAP Manual)

2022 QAP Attachment Date Printed: 3/17/2022



Appendix F - Construction Materials Accepted by a Certificate of Compliance *

Soil Amendment

Fiber

Mulch

Stabilizing Emulsion

Plastic Pipe

Lime

Reinforcing Steel

Structural Timber and Lumber

Treated Timber and Lumber

Timber and Lumber

Culvert and Drainage Pipe Joints

Reinforced Concrete Pipe

Corrugated Steel Pipe and Corrugated Steel Pipe Arches

Structural Metal Plate Pipe Arches and Pipe Arches

Perforated Steel Pipe

Polyvinyl Chloride Pipe and Polyethylene Tubing

Steel Entrance Tapers, Pipe Down drains, Reducers, Coupling Bands and Slip Joints

Aluminum Pipe (Entrance Tapers, Arches, Pipe Down drains, Reducers, Coupling Bands and Slip Joints)

Metal Target Plates

Electrical Conductors

Portland Cement

Minor Concrete

Waterstop

Note: Usually these items are inspected at the site of manufacture or fabrication and reinspected after delivery to the job site.

^{*} If Caltrans Standard Specifications May 2006 is part of contract specifications.

Vendor's Certificate of Compliance Certificate of Compliance for Portland Cement

(Appendix J.1 and J.2 of the QAP Manual)



Appendix J.1 - Example of a Vendor's Certificate of Compliance

No. 583408

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION VENDOR'S CERTIFICATE OF COMPLIANCE MR-0543 (REV. 5/03) #CT-7541-6020-2.
PRECAST CONCRETE PRODUCTS OR SOUNDWALL
TO: BILL SYNDER
STATE HIGHNAY ENGINEER -CITY OF FLATLAND
We certify that the portland coment, chemical and mineral administratives contained in the material described below are brands stated and comply with specifications for:
CONTRACT NUMBER:
SEMENT BRAND WILL LOCATION MEDI AND
THE IT MODIFIED CALIFORNIA
CHEMICAL ADMIXTURE
1. BRAND A DE A DE ANTI-LE MANUFACTURER
THE WATER REDUCER XYZ SUPPLIER
2. BRAND MANUFACTURER.
TYPE
GIECK BOX IF A CHEMICAL ADMIXTURE WAS NOT USED
MINERAL ADMIXTURE
MANUFACTUREN CLASS
CHECK BOX IF A MINERAL ADMINITURE WAS NOT USED
DELINERY DATE (Resp) May 7
LISTPRODUCTS TO WHICH CERTIFICATE APPLIES. (Show size and lin. It, of pipe, etc., y delivery slip numbers for mady-mit.)
Portland Climent
Flyask White Reducer
MANUFACTURER OF CONCRETE PRODUCTS A. F.B. READY MIX
By: AUTHORIZED REPRESENTATIVE SIGNATURE
Joe anderson
FM 83 1839 Original to Res. Engr. Retain Duplicate. DSP 01 55624



Appendix J.2 - Example of a Certificate of Compliance for Portland Cement (continued)

This is to certify that the

Portland Cement .

Supplied by ABC Cement Company complies with all requirements for Type II Portland Cement when tested in accordance with ASTM C - 494.

Local Agency Project No. HP21L - 5055 - 111 Albert Howakowa
Quality Assurance Engineer
ABC Cement Company

Date: <u>07/07/07</u>.

Examples of Materials Certificates/Exceptions

(Appendix K of the QAP Manual)



Appendix K - Examples of Materials Certificates/Exceptions (Signed by the Resident Engineer at the Completion of the Project)

Federal-aid Project No.: <u>Project HP21L – 5055 –</u>	<u>- 111</u>	
Subject: Materials Certification		
This is to certify that the results of the tests on ac incorporated in the construction work and the construction and testing were in conformity with the app	netruction operations controlled by compline	
All materials exceptions to the plans and s	specifications on this project are noted below	v.
No exceptions were found to the plans and spec	cifications on this project.	
Bill Sanders	Bill Sanders	7/7/07
Resident Engineer (Print Name)	Resident Engineer (Signature)	(Date)
Note: The signed original of this certificate copy is mailed to the DLAE and filed under		oject files and one

See the attachment (next page)



Appendix K (continued)

Attachments: Materials Exceptions (Acceptance Testing)

Type of Test	Description of Work	Total Tests Performed On the Project	Number of Failed Tests	Action Taken
Slump Test	Concrete Sidewalk	8	1	When the measured slump exceeded the maximum limit, the entire concrete load was rejected.
Sand Equivalent	Aggregate for Structural Concrete	10	1	The tested S.E. was 70 and the contract compliance specification was 71 minimum. However, the concrete 28-day compressive strength was 4800 psi. The concrete was considered adequate and no materials deductions were taken.
Compaction	Sub grade Material	12	1	One failed test was noted. The failed area was watered and reworked. When this was completed, a retest was performed. The retest was acceptable.
Compaction	Hot Mix As- phalt	12	1	One failed area was noted. It was reworked and retested. The second test met specifications.

Bill Sanders	Bill Sanders	July 4, 2007
Resident Engineer (Print Name)	Resident Engineer (Signature)	Date

Example of a Log Summary Sheet

(Appendix H of the QAP Manual)



Appendix H - Example of a Log Summary Sheet

Subgrade Materials

Date	CT	Station	Elevation	Test Results	Minimum Spec.	Passed or Failed	Action Taken
5/15/07	231	1+ 00 (30° L)	99.00	93	90 or greater	Passed	N/A
5/16/07	231	1+ 50 (20° R)	100.50	94	90 or greater	Passed	N/A
5/17/07	231	2+ 25 (25' R)	101.00	96	90 or greater	Passed	N/A
5/18/07	231	1+ 50 (30° L)	101.50	95	95 or greater	Passed	N/A
5/19/07	231	2+ 50 (20° L)	102.00	92 *	95 or greater	Failed	See Note 1
5/19/07	231	2+ 50 (20° L)	102.00	95	95 or greater	Passed	N/A

CT 231 = Compaction (Nuclear Gage)

Aggregates and Base Materials

Date	ĈŦ.	Station	Elevation	Test Re-	Minimum Spec.	Passed or Failed	Action Taken
6/20/07	202	1+ 00 (10' R)	102.50	See data sheet	See data sheet	Passed	N/A
6/20/07	202	2+ 00 (20° L)	102.50	See data sheet	See data sheet	Passed	N/A
6/22/07	217	1+ 00 (10' R)	102.50	75	25 or greater	Passed	N/A
6/22/07	217	2+ 00 (20° L)	102.50	83	25 or greater	Passed	N/A
6/20/07	227	1+ 00 (20' R)	102.50	86	71 or greater	Passed	N/A
6/20/07	227	1+ 50 (20° L)	102.50	85	71 or greater	Passed	N/A
6/24/07	231	2+ 00 (20° R)	102.50	98	95 or greater	Passed	N/A
6/24/07	231	2+ 50 (20° L)	102.50	97	95 or greater	Passed	N/A

CT 202 = Sieve Analysis, CT 217 = Sand Equivalent, CT 227 = Cleanness Value, CT 231 = Compaction (Nuclear Gage)

^{*} Note 1: The Contractor used a water tank to dampen the soil surface at the failed subgrade location. Using a sheep's foot compactor, he reworked the subgrade (making at least 10 passes) from Station 2+ 00 to Station 3+ 00. After approximately 30 minutes, another compaction test was taken. This time the relative compaction was 95.



Appendix H (continued)

Hot Mix Asphalt

Date	CT	Station	Elevation	Test Results	Minimum Spec.	Passed or Failed	Action Taken
7/10/07	339	1+ 00 (10' R)	103.00	0.08 gal/ sq yd	0.05 -0.10 gal/sq yd	Passed	N/A
7/10/07	366	2+ 00 (20° L)	103.00	32	>23	Passed	N/A
7/10/07	366	1+ 00 (10' R)	103.00	41	>23	Passed	N/A
7/10/07	375	2+ 00 (20° L)	103.00	94	RC = 93 to 97	Passed	N/A
7/15/07	375	1+ 00 (20' R)	103.00	96	RC = 93 to 97	Passed	N/A
7/15/07	375	1+ 50 (20° L)	103.00	95	RC = 93 to 97	Passed	N/A

CT 339 = Distributor Spread Rate, CT 366 = Stabilometer Value

CT 375 = In-Place Density & Relative Compaction

Portland Cement Concrete

Date	CT	Station	Elevation	Test Results	Minimum Spec.	Passed or Failed	Action Taken
9/25/07	504	10 + 50 (50° R)	102.50	6.5%	>6.0%	Passed	N/A
9/25/07	533	12 + 50 (50° R)	102.50	1.5"	<2"	Passed	N/A
9/25/07	518	11 + 50 (50° R)	102.50	151 lb/cu ft	> 145 lb/cu ft	Passed	N/A
9/25/07	521	10 + 50 (50° R)	102.50	28 day = 4200 psi	>3800 psi	Passed	N/A
9/28/07	521	11 + 50 (50° R)	102.50	28 day = 4290 psi	>3800 psi	Passed	N/A
9/30/07	521	12 + 50 (50° R)	102.50	28 day = 4160 psi	>3800 psi	Passed	N/A

CT 504 = Air Content, CT 518 = Unit Weight, CT 521 = Compressive Strength,

CT 533 = Ball Penetration