

CITY OF LEMOORE
QUALITY ASSURANCE PROGRAM (QAP)

March 2023

- This QAP shall be updated every five years, or more frequently if there are changes to the testing frequencies - or to the tests themselves.

Approved By:



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City Engineer

Date **3/14/2023**

CITY OF LEMOORE
Quality Assurance Program

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CITY OF LEMOORE

Quality Assurance Program

INTRODUCTION

The City of Lemoore Quality Assurance Program (QAP) is a program that will ensure the materials and workmanship incorporated into each construction project conform to the requirements of the contract plans and specifications including approved changes. This program applies to Federal-aid construction projects that are off the National Highway System (NHS) and off the State Highway System (SHS). For projects on the NHS and SHS, the procedures described in Section 16.11, Quality Assurance Program, of the Local Assistance Procedures Manual shall be followed. This QAP will be updated at least every five years.

The main elements of this QAP are:

1. Acceptance Testing (AT): AT is used to determine the quality and acceptability of materials and workmanship incorporated into the project.
 - a) Minimum Sampling and Testing Frequency Requirements
 - b) Sample Testing Results Summary Log

2. Independent Assurance (IA) Program: IA is a verification process that AT is being performed correctly by qualified testers and laboratories.
 - a) Tester Certification Process
 - b) Laboratory Qualification Process
 - c) Equipment Calibration Process

3. Testing of Manufactured and Fabricated Materials:
 - a) Materials Accepted by a Certificate of Compliance per the Contract Specifications
 - b) Source Inspection Process: AT of manufactured and prefabricated materials at locations other than the job site, generally at the manufactured location.

4. Materials Certification Process for completed project

MATERIALS LABORATORY

The City of Lemoore engages qualified consulting firms (“laboratory”) to perform AT on Federal-aid and other designated projects.

The laboratory shall have a written policy and procedures, conforming to this QAP, acceptable to the City of Lemoore, to assure that facilities performing testing activities on City of Lemoore projects are capable of providing testing services in compliance with applicable test methods. The materials laboratory shall be under the responsible management of a California registered 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 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 of more to the following testing programs:
 - a. AASHTO Materials Reference Laboratory (AMRL)
 - b. Cement and Concrete Reference Laboratory (CCRL)
 - c. Caltrans' Reference Samples Program (RSP)
2. Certification of Personnel – The materials laboratory shall employ personnel who are certified by one or more to the following:
 - a. Caltrans District Materials Engineer
 - b. Nationally recognized non-Caltrans organizations such as the American Concrete Institute, Asphalt, National Institute of Certification of Engineering Technologies, etc.
 - c. Other recognized organizations approved by the State of California and/or recognized by local governments or private associations.
3. Laboratory and Testing Equipment – The materials laboratory shall only use laboratory and testing equipment that is in good working order. All such equipment shall be calibrated at least once each year. All testing equipment must be calibrated by impartial means using devices of accuracy acceptable 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.

ACCEPTANCE SAMPLING AND TESTING (AT)

Acceptance Testing is sampling and testing performed to determine the degree of compliance with contract requirements. Sampling and Testing Frequency Tables (Exhibit A) are used to document and summarize the Acceptance Testing frequency, methodology and construction sampling location required.

Materials entering a construction project shall be tested to verify, the materials or products comply with the contract specifications and/or standards. The results from these tests shall be used to determine the quality and acceptability of materials and workmanship incorporated into the project.

Acceptance sampling and testing of materials or work should start the first day a construction material is placed or work is performed. To obtain the greatest benefit, testing should be performed as soon as possible after samples are taken or segments of work are completed. This

provides early test data for the Resident Engineer's and contractor's guidance. Testing methods will be in accordance with California Test Methods (CTM) or a national recognized standard (i.e., AASHTO, ASTM, etc.) as specified in the contract specifications.

The local agency Resident Engineer shall maintain a "Log Summary" sheet for all acceptance tests performed on the project. The "Log Summary" shall include appropriate data such as date, station location, elevation or depth of test sample, and test result. Failing tests results require retesting of the material with cross-references of the retest to the initial failing test result previously entered in the "Log Summary."

Representative samples of all materials entering into the work shall be sampled at the location specified in the standard specifications or special provisions. If not so specified, the samples shall be taken at the location indicated in the "Frequency Tables" (Exhibit 'A').

For each type of test that they perform, Acceptance Testers shall have current certification from Caltrans or some other recognized organization that has a nationally known proficiency testing program.

INDEPENDENT ASSURANCE PROGRAM

IAP shall be provided by personnel from Caltrans, the Agency'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.

Poor correlation between acceptance tester's results and other test results may indicate probable 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 Agency. IAP samples and tests are not to be used for determining compliance with contract requirements. Compliance with contract requirements is determined only by AT.

TESTING OF MANUFACTURED MATERIALS

This element of the QAP establishes procedures for inspecting, accepting and testing, of manufactured and prefabricated materials either by source inspection, job site inspection, or certificate of compliance.

Source inspection: Source inspection is acceptance testing of manufactured and prefabricated materials at locations other than the job site. For each type of material inspected or tested, the Acceptance Tester shall have current certification from Caltrans or some other recognized organization such as NICET (National Institute for Certification in Engineering Technologies) or ACI (American Concrete Institute).

If the City of Lemoore cannot perform the source inspection and qualified consultants are not available, the City of Lemoore may request that Caltrans conduct the inspections on a reimbursed basis for NHS and non-NHS projects. Such request for source inspection must comply with the procedures described in Chapter 16 of the Local Assistance Procedures Manual under “Source Inspection.”

Job site inspection: The City of Lemoore reserves the right to reject non-conforming materials, whether or not a Certificate of Compliance was issued.

Certificate of Compliance: The use of certain manufactured products, materials or assemblies accompanied by a Certificate of Compliance shall be permitted. Exhibit ‘C’ lists the materials typically accepted by Certificate of Compliance.

REPORTING TEST RESULTS

The following are goals for reporting material test results to the Resident Engineer:

- When the aggregate is sampled at materials plants, test results for Sieve Analysis, Sand Equivalent and Cleanness Value should be submitted to the Resident Engineer within 24 hours after sampling.
- 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.
- When soils and aggregates are sampled at the job site, test results for Sieve Analysis, Sand Equivalent and Cleanness Value should be submitted to the Resident Engineer within 72 hours after sampling.
- When soils and aggregates are sampled at the job site, test results for “R” Value and asphalt extraction should be submitted to the Resident Engineer within 96 hours after sampling.

When sampling products such as Portland Cement Concrete (PCC), cement treated base (CTB), hot mix asphalt concrete (AC/HMA), and other such materials, the time of such sampling shall be varied with respect to the time of day in so far as possible, to avoid a predictable sampling routine. The reporting of AT test results shall be done on an expedited basis such as by email, facsimile or telephone.

RECORDS

All material records of samples and tests, material releases and certificates of compliance for a given project shall be incorporated into the Resident Engineer's project file. This file shall be organized as described in Section 16.8 of Caltrans Local Assistance Procedures Manual (Exhibit 'D' herein). The complete project file shall be available at a single location for inspection by Caltrans and FHWA personnel at any time during the construction project. The file, including all material records, shall be available at the City of Lemoore, Public Works Department for at least three years following the date of final project voucher.

As described above under "Acceptance Sampling and Testing", the Resident Engineer shall maintain a "Summary Log." The "Summary Log" facilitates reviews of material sampling and testing by Caltrans and FHWA reviewing personnel and assists the Resident Engineer in tracking the frequency of testing.

PROJECT CERTIFICATION

Upon completion of the project, a "Materials Certification" shall be completed by the Resident Engineer. The City of Lemoore shall include a "Materials Certificate" (as described in the Local Programs Manual) 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 project file held by the City of Lemoore. The registered engineer in charge of the construction function for the City of Lemoore, which may be the Resident Engineer or the City Engineer, shall execute the "Materials Certificate." All materials incorporated in the work that do not conform to the specifications will be explained and justification provided on the "Materials Certificate." Including chances by virtue of an approved Contract Change Order.

TESTING FREQUENCY

Testing Frequency requirements are indicated on the *Sampling and Testing Frequency Table*, Exhibit A.

PROCEDURE FOR DISPUTE RESOLUTION

If the contractor or member of a private laboratory has a dispute with the local agency involving a quality assurance item, a manager from the local agency shall be selected to review the dispute. The Resident Engineer and/or Independent Arbitrator (IA) person and the party in dispute will submit his/her substantiating paperwork to the management person within 10 days after requested to do so. In some cases, one or more meetings may be needed to resolve the disputes. Within a 30-day period, the local agency management person should try to resolve the dispute based on the evidence presented. Appeals by the contractor, Resident Engineer, the IA person, or acceptance sampler or tester may be made after the final decision by the local agency management person. The person making the appeal should be directed to contact the Caltrans

District Local Assistance Engineer no more than 14 days after receiving written notice of final decision by the local agency management person.

The District Local Assistance Engineer will head up the appeal process. Again, evidence will be presented and a final decision should be made within 30 days after receipt of the appeal. For additional guidelines concerning the dispute resolution process, refer to Caltrans IA Manual.

CITY OF LEMOORE QUALITY ASSURANCE PROGRAM

EXHIBITS

- Exhibit 'A' Exhibit 16-R Sampling and Testing Frequency Table for projects OFF the SHS
- Exhibit 'B' Caltrans Test Method - ASTM Test Method Conversion Chart
- Exhibit 'C' Exhibit 16-T1: Materials Requiring a Certificate of Compliance per Caltrans Standard Specifications
- Exhibit 'D' Section 16.8 "Engineers Daily Report & Sample Form" from Caltrans Local Assistance Procedures Manual

EXHIBIT 'A'

**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.
(See note 1 and 2 regarding sampling and sample size.)**

ASPHALT CONCRETE (Note, sampling and testing is performed on the aggregates and asphalt, AND on the HMA.)

Quality Characteristic	Test Method (See note 2)	Acceptance Test Frequency	Location of Sampling
Aggregate			
Aggregate Gradation (Sieve)	CT 202	Production start up evaluation. Minimum 1 per day of paving of at least 300 tons per day.	HMA plant.
Sand Equivalent	CT 217		
Asphalt Binder			
Various properties based on asphalt type (see Standard Specifications Section 92)	See Standard Specifications Section 92	Sample daily for placement over 300 tons per day; store; no test required unless warranted by concern	Asphalt feed line connecting to plant storage tanks.
In place Type A HMA			
Moisture Content	AASHTO T 329	Production start up evaluation, and minimum 1 per project.	Loose mix from behind the paver.
Asphalt Binder Content	AASHTO T 308, Meth. A	Production start up evaluation; minimum 1 per day of paving of at least 300 tons per day.	
Maximum Theoretical Density	AASHTO T 209		
Air Void Content	AASHTO T 269	Production start up evaluation; minimum 1 for every 25,000 tons of paving.	
Voids in Mineral Aggregate	SP-2 Asphalt Mixture Volumetrics		
Dust Proportion	SP-2 Asphalt Mixture Volumetrics		
Hamburg Wheel Tracker	AASHTO T 324 (Modified)	Production start up evaluation; minimum 1 for every 10,000 tons of paving.	Loose mix at plant, truck or windrow.
Moisture Susceptibility	AASHTO T 283	Production start up evaluation; minimum 1 random for every 50,000 tons of paving.	
Pavement Density			
Density of cores (See note 3)	California Test 375	1 for each 250 tons (for thickness of 0.15' or greater)	Final layer, total paved thickness
Pavement Smoothness			
Straightedge	See Standard Specifications Section 36-3.01D9(b)(i)	Entire surface Per Standard Specifications Section 36-3.01D(4).	Final Pavement Surface
Inertial Profiler			

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	At site of in-place density test hole.

AGGREGATE BASES AND SUBBASES, IMPORTED BORROW

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement.
R-Value	CT 301		
Sand Equivalent	CT 217		
Maximum Density and Relative Compaction	CT 216/CT 231	1 Min. Test per 5000 sq ft	At site of in-place density test hole.

STRUCTURE BACKFILL, SELECT BACKFILL

Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 Min. Test Per Material Source	Sample from site stockpile/plant prior to placement
R-Value	CT 301		
Sand Equivalent	CT 217		
Maximum Density and Relative Compaction	CT 216/CT 231	1 Min. Test Per 2 Vertical Lifts of Placement	At site of in-place density test hole.

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

COARSE AGGREGATE		(Note, aggregates are tested <i>and</i> wet mix is tested.	
Quality Characteristic	Test Method	Minimum Sampling and Testing Frequency	Location/Time of Sampling
Sieve Analysis	CT 202	1 min. test per 500 cu yds and per each material source ; 1 min. test on smaller projects; If bridge, 1 min. set per separate pour per abutment/pier/deck.	Sample from site stockpile/plant prior to placement
Cleanness Value	CT 227		

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

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

(1) Refer to CA Test 125 for sampling procedures

(2) Sample sizes must be based on split samples - one sample for acceptance testing and one for dispute resolution. Store one-half of the boxes, cans, or bags for dispute resolution.

(3) Determine percent of theoretical maximum density under California Test 375, except use AASHTO T 275 to determine in-place density of each core and AASHTO T 209, Method A to determine theoretical maximum density instead of calculating maximum density.

EXHIBIT 'B'

**CALTRANS TEST METHOD -
ASTM TEST METHOD CONVERSION CHART**

CALTRANS TEST METHOD - ASTM TEST METHOD CONVERSION CHART**Testing Procedures - for local agency use only**

Use this CTM - ASTM conversion chart to assist you in determining acceptance test requirements and frequencies, as detailed in Caltrans *Construction Manual* Chapter 6, "Sampling and Testing." Refer to the Agency, special provisions, contract plans, and applicable standard specifications, for correct sampling and test methods (ASTM-CTM).

CTM	ASTM Book of Standar	TEST PROCEDURE	NOTES
105		Calculations Pertaining to Gradings and Specific Gravities	2
125	D75 4.02 D979 4.03	Sampling Highway Materials (when approved) Standard Practice for Sampling Aggregates Practice for Sampling Bituminous Paving Mixtures	3 3
201	C702 4.02	Soil & Aggregate Sample Preparation Reducing Field Samples of Aggregate to Testing Size	13
202	C136 4.02 C117 4.03	Sieve Analysis of Fine and Coarse Aggregate Sieve Analysis of Fine and Coarse Aggregate Material Finer Than 75-um (#200) Sieve in Mineral Aggregates by Washing	
205		Percentage of Crushed Particles	1
206	C127 4.02	Specific Gravity and Absorption of Coarse Aggregate Specific Gravity and Absorption of Coarse Aggregate	
207	C128 4.02	Specific Gravity and Absorption, Fine Aggregate Specific Gravity and Absorption, Fine Aggregate	
208		Apparent Specific Gravity of Fine Aggregate	1
211	C131 4.02	Abrasion of Coarse Aggregate by Use of the Los Angeles Rattler Machine Resistance to Degradation, Small-Size Coarse Agg. by Abrasion & Impact, L.A. Machine	
213	C40 4.02	Organic Impurities in Concrete Sand Organic Impurities in Fine Aggregate for Concrete	
214	C88 4.02	Soundness of Aggregates by Use of Sodium Sulfate Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	1
216	D1556 4.08 D1557 4.08	Relative Compaction of Untreated and Treated, Soils & Aggregates Density of Soil In-place by the Sand Cone Method Moisture-Density Relations of Soils & Soil-Agg. Mixtures, 10-lb. Rammer, 18-in	11
217		Sand Equivalent (only authorized method per Caltrans 07, District Materials)	1,9
223		Surface Moisture in Concrete Aggregate	1
226	C566 4.02	Moisture Content in Soils by Oven Drying Total Moisture Content of Aggregate by Drying	
227		Evaluating Cleanness of Coarse Aggregate	1
229	D3744 4.03	Durability Index Aggregate Durability Index	1
231	D2922 4.08	Relative Compaction of Soils by the Area Concept Utilizing Nuclear Gages Density of Soil & Soil-Aggregate In-place by the Nuclear Method	4 4

Caltrans Test Method- ASTM Test Method Conversion Chart

CTM - ASTM Testing Procedures - for local agency use only

Use this CTM - ASTM conversion chart to assist you in determining acceptance test requirements and frequencies, as detailed in Caltrans *Construction Manual* Chapter 6, "Sampling and Testing." Refer to the Agency, special provisions, contract plans, and applicable standard specifications, for correct sampling and test methods (ASTM-CTM).

CTM	ASTM	Book of Standards	TEST PROCEDURE	NOTES
301	D2844	4.08	R-Value of Treated & Untreated. Bases, Subbases & Basement Soils R-Value and Expansion Pressure of Compacted Soils	1
302	D1664	4.03	Film Stripping Coating and Stripping of Bitumen-Aggregate Mixtures	
303			Centrifuge Kerosene Equivalent	1
304	D1561	4.03	Preparation of Bituminous Mixtures for Testing Prep. of Bituminous Mixture Test Specimens by Means of Calif. Kneading Compactor	1
305			Swell of Bituminous Mixtures	1
307			Moisture Vapor Susceptibility of Bituminous Mixtures	1
308	D1188	4.03	Bulk Specific Gravity and Weight Per Cubic Foot of Bituminous Mixtures Bulk Sp.G. and Density of Compacted Bituminous Mixtures, Paraffin-Coated Specimens	
310	D2172	4.03	Asphalt and Moisture Contents of Bituminous Mixtures by Hot Solvent Extraction of Bitumen from Bituminous Paving Mixtures (Method A, B, or C)	5 6,10
312			Design and Testing of Class "A" and "B" Cement Treated Base	1
338			Cement or Lime Content in Treated Aggregate by the Titration Method	1
339	D2995	4.03	Determination of Distributor Spread Rate Determining Application Rate of Bituminous Distributors	
362	D2172	4.03	Asphalt Content of Bituminous Mixtures by Vacuum Extraction Quantitative Extraction of Bitumen from Bituminous Paving Mixtures	5 6
366			Stabilometer Value	1
367			Recommending Optimum Bitumen Content (OBC.)	1
370	D4643	4.08	Determining Moisture Content of Asphalt Mixtures or Mineral Agg., Microwave Ovens Determination of Water (Moisture) Content of Soil by the Microwave Oven	
375	D2950	4.03	In-place Density & Relative Compaction of AC Pavement (nuclear) Density of Bituminous Concrete In-place by the Nuclear Method	5,7,12 6,7
379	D4125	4.03	Asphalt Content of Bituminous Mixtures by use of the Troxler Nuclear Gage Asphalt Content of Bituminous Mixtures by the Nuclear Method	5,8 6,8
405			Chemical Analysis of Water	1
415			Chloride Content in Organic Additives for Portland Cement Concrete	1

Caltrans Test Method- ASTM Test Method Conversion Chart

CTM - ASTM Testing Procedures - for local agency use only

Use this CTM - ASTM conversion chart to assist you in determining acceptance test requirements and frequencies, as detailed in Caltrans *Construction Manual* Chapter 6, "Sampling and Testing." Refer to the Agency, special provisions, contract plans, and applicable standard specifications, for correct sampling and test methods (ASTM-CTM).

CTM	ASTM	Book of Standard	TEST PROCEDURE	NOTES
504	C231	4.02	Air Content of Freshly Mixed Concrete by the Pressure Method Air Content of Freshly Mixed Concrete by the Pressure Method	
515			Relative Mortar Strength of Portland Cement Concrete Sand	1
518	C138	4.02	Unit Weight of Fresh Concrete Unit Weight, Yield, and Air Content (Gravimetric) of Concrete	
521	C39	4.02	Compressive Strength of Molded Concrete Cylinders Compressive Strength of Cylindrical Concrete Specimens	
523	C293 C78	4.02 4.02	Flexural Strength of Concrete (using simple beam with center-point loading) Flexural Strength of Concrete (using simple beam with center-point loading) Flexural Strength of Concrete (using simple beam with third-point loading)	1
528			Freeze Thaw Resistance of Aggregates in Air-Entrained Concrete	1
529			Proportions of Coarse Aggregate in Fresh Concrete	1
530			Determining the Effect of H ₂ O-Reducing and Set-Retard. Admix. Drying Shrinkage PCC	1
533	C360 C143	4.03 4.02	Ball Penetration in Fresh Portland Cement Concrete Ball Penetration in Fresh Portland Cement Concrete Slump of Freshly Mixed PCC	
539	C172	4.02	Sampling Fresh Concrete Sampling Freshly Mixed Concrete	
540	C31	4.02	Making, Handling, & Storing Concrete Compressive. Test Specimens in the Field Making & Curing Concrete Test Specimens in the Field	
541			Flow of Grout Mixtures (flow cone method)	1
543	C173	4.02	Air Content of Freshly Mixed Concrete by the Volumetric Method Air Content of Freshly Mixed Concrete by the Volumetric Method	
548			Evaluation of Aggregate for Lean Concrete Base (LCB.)	1

Notes

1. Use the CALTRANS Method.
2. Use the methods of calculation within the applicable test method first. Refer to CTM 105 as necessary.
3. Use the Caltrans Construction Manual procedures as necessary when ASTM D75 or D979 do not adequately cover the item to be sampled.
4. Use the direct transmission method only, the air gap method shall not be used. All nuclear gages must have local Caltrans District calibration within the last year. The data sheets provided by the local Caltrans District shall be used when determining the in-place density.
5. Sample from the job site, across the mat, immediately behind the paving machine (Caltrans Construction Manual).
6. Sample per ASTM D 979 paragraph 4.2.3., sample from the job site, across the mat, immediately behind the paving machine.
7. All nuclear gages used for this test must be calibrated on the six (6) DNTM&R AC Standard Blocks. The Data sheets provided by the local Caltrans District shall be used when determining the in-place density.
8. Recommended Percent (%) AC method for Rubberized Bituminous Paving mixtures.
9. The hand method of shaking is not authorized and shall not be used. An electro-mechanical or hand- operated mechanical. Sand Equivalent shaker must be utilized for this test.
10. This Method covers hot solvent, centrifuge, and vacuum extraction.
11. Compaction Apparatus shall be calibrated in accordance with ASTM D 2168, Method B (ASTM Book 4.08).
12. Test Maximum Density (TMD) shall be performed by Caltrans Test Method 375, Section F. Test Max. Density.
13. Splitters must be of the fixed riffle type (no adjustable splitters).

EXHIBIT 'C'

**MATERIALS TYPICALLY ACCEPTED BY
CERTIFICATE OF COMPLIANCE**

Exhibit 16-T1: Materials Requiring a Certificate of Compliance per Caltrans Standard Specifications

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
6-1.04 BUY AMERICA		
6-1.04B	Crumb rubber	COC
6-1.04C	Steel and iron materials	COC + cert. mill test reports
11-2 WELDING QUALITY CONTROL		
11-2.03D	Welding	COC
12-3 TEMP. TRAFFIC CONTROL DEVICES		
12-3.03A(3)	Plastic traffic drums	COC
12-3.20A(3)	Type K temporary railing	COC
12-3.23A(3)	Attenuator	COC
12-3.32A(3)	Portable CMS	COC
13-2 WATER POLLUTION CONTROL PROGRAM		
13-9 TEMP. CONCRETE WASHOUTS		
13-9.01C	Fabric bags for gravel-filled bags	COC
	Plastic liner	COC
13-10 TEMP. LINEAR SEDIMENT BARRIERS		
13-10.01C	Fiber rolls	COC
	Silt fence fabrics	COC
	Sediment filter bags	COC
	Foam barriers	COC
	Fabric for gravel-filled bags	COC
16-2.03 TEMP. HIGH-VISIBILITY FENCES		
16-2.03A(3)	High-visibility fabric	COC
18 DUST PALLIATIVES		
18-1.01C	Dust suppressant	COC
	Dust control binders	COC
	Fibers	COC
20 LANDSCAPE		
20-2 IRRIGATION		
20-2.08A(3)	Polyethylene pipe	COC
	Plastic pipe supply line	COC

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
20-3 PLANTING		
20-2.08A(3)	Sod	COC
	Soil amendment	COC
20-5 LANDSCAPE ELEMENTS		
20-5.03A(1)(c)	Filter fabric	COC + product data
20-5.03D(1)(c)	Solidifying emulsion	COC + product data & samples
20-5.04A(3)	Wood mulch	COC + sample & authorization
21-2 EROSION CONTROL WORK		
21-2.01C(1)	Straw	COC
	Weed-free straw	COC + cert. of quarantine
	Fiber	COC
	RECP	COC
	Fasteners	COC
	Hydraulically applied erosion control materials	Submit records
21-2.01C(2)	Compost	Submit reports
21-2.01C(3)	Seed	Submit reports
21-2.01C(4)	Tackifier	COC
	Bonded fiber matrix	COC
24 STABILIZED SOILS		
24-1.01C(1)	Stabilizing agent	COC + sample
24-3 CEMENT STABILIZED SOIL		
24-3.01C	Cement	COC + sample
36-2 BASE BOND BREAKER		
36-2.01C	Base bond breaker	COC
37 BITUMINOUS SEALS		
37-1.01C	Asphalt binder	COC + test results
	Asphalt emulsion	COC + test results
37-3 SLURRY SEALS AND MICRO-SURFACINGS		
37-3.01A(3)	Asphaltic emulsion	COC + samples & test results
	Polymer modified asphaltic emulsion	COC + samples & test results
	Micro-surfacing emulsion	COC + sample & test results
37-2.04 ASPHALT RUBBER BINDER CHIP SEALS		
37-2.04A(3)	Asphalt rubber binder ingredients	COC + permits & submittals

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
37-5 PARKING AREA SEALS		
37-5.01C	Parking area seal material	COC + sample & test results
37-6 CRACK TREATMENTS		
37-6.01C	Crack treatment materials	COC or sample & test results
39-2 HOT MIX ASPHALT		
39-2.01A(3)(f)	Liquid antistrip	COC + sample & production data
39-2.03A(3)(c)	Crumb rubber modifier	COC + test results
	Asphalt modifier	COC + test results
39-2.05A(1)(c)	Asphaltic emulsion	COC + test results
40 CONCRETE PAVEMENT		
40-1.01C(2)	Tie bars	COC
	Splice couplers for threaded bars	COC
	Dowel bars	COC
	Tie bar baskets	COC
	Joint filler	COC
	Epoxy-powder coating	COC
41 EXISTING CONCRETE PAVEMENT		
41-5 JOINT SEALS		
41-5.01C	Liquid joint sealant	COC + SDS & instructions
	Backer rods	COC + SDS & instructions
	Compression joint seal	COC + SDS & instructions
	Lubricant adhesives	COC + SDS & instructions
41-10 DRILL AND BOND BARS		
41-10.01C	Tie bars	COC
	Dowel bars	COC
	Dowel bar lubricant	COC
	Chemical adhesive	COC
	Epoxy powder coating	COC
48-2 FALSEWORK		
48-2.01C(1)	Structural composite lumber	COC + submittals
49-2 DRIVEN PILING		
49-2.02A(3)(d)	Steel pipe piles	COC + tests & mill reports
49-2.03A(3)	Structural shape steel piling	COC + test reports

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
51 CONCRETE STRUCTURES		
51-1.01C(3)	Bonding materials	COC or sample & authorization
51-2 JOINTS		
51-2.01A(3)	Polyethylene material for snowplow deflectors	COC
51-2.02B(1)(c)	Sealant	COC + test reports & samples
51-2.02C(1)(c)	Elastomeric joint seal	COC + test reports
	Lubricant-adhesive	COC + test reports
51-2.02D(1)(c)	Joint seal materials	COC + authorization
51-2.02E(1)(c)(iii)	Joint seal assembly materials	COC
51-2.02F(1)(c)(iv)	Material used in the joint seals	COC + test reports
51-2.04A(3)	Waterstop material	COC + a statement
51-3 BEARINGS		
51-3.02A(3)(c)	Elastomer for bearing pads	COC + test reports
51-4 PRECAST CONCRETE MEMBERS		
51-4.01C(1)	Concrete box culvert	COC
52 REINFORCEMENT		
52-1.01C(3)	Reinforcement (rebar)	COC + mill test report
52-2 EPOXY-COATED REINFORCEMENT		
52-2.02A(3)(c)	Epoxy-coated reinforcement	COC + submittals
	Patching material	COC + a statement
52-5.01C(4)	Headed bar reinforcement	COC + test reports
52-6 SPLICING		
52-6.01C(5)	Service or butt splice material	COC + submittals
54 WATERPROOFING		
54-3 PREFORMED MEMBRANE WATERPROOFING		
54-3.01C	Prefomed membrane sheet	COC + report
54-5 DECK SEAL		
54-5.01C	Prefomed membrane sheet	COC + report
57-2 WOOD STRUCTURES		
57-2.01A(3)	Timber and lumber	COC + report
	Glued laminated timbers/decking	COC
57-3 PLASTIC LUMBER STRUCTURES		
57-3.01C(1)	Plastic lumber	COC + test report & sample

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
58-2 MASONRY BLOCK		
58-2.01C(7)	CMUs	COC
	Aggregate for grout	COC
	Grout	COC
59 STRUCTURAL STEEL COATINGS		
59-1.01C	Blast cleaning material	COC + SDS
59-5 THERMAL SPRAY COAT STRUCTURAL STEEL		
59-5.01C(1)	Wire feedstock	COC
60-3.04B POLYESTER CONCRETE OVERLAYS		
60-3.04B(1)(c)	Methacrylate resins	COC + samples & test report
	Polyester resins	COC + samples & test report
	Aggregates	COC + samples & test report
61-2 CULVERT AND DRAINAGE PIPE JOINTS		
61-2.01C	Joint systems	COC + test results & reports
	Couplers	COC
64 PLASTIC PIPE		
64-1.01C	Plastic pipe	COC + report
65-2 REINFORCED CONCRETE PIPE		
65-2.01C	RCP, direct design method	COC + report
66 CORRUGATED METAL PIPE		
66-1.01C	Corrugated steel materials	COC
	Corrugated aluminum materials	COC
67-3 METAL LINE PLATE PIPE		
67-3.01C	Metal liner plate pipe	COC + mill test reports
68 SUBSURFACE DRAINS		
68-1.01C	Subsurface drain	COC
68-2 UNDERDRAINS		
68-2.01C	Pipe	COC
	Tubing	COC
	Fittings	COC
68-7 GEOCOMPOSITE DRAIN SYSTEMS		
68-7.01C	Geocomposite drain	COC + flow capability graph

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
69 OVERSIDE DRAINS		
69-1.01C	Steel pipe piles	COC
	Aluminum	COC
	Plastic	COC
70-6 GRATED LINE DRAINS		
70-6.01C	Grated line drains	COC + docu. & inspec. report
71-3.09 MACHINE SPIRAL WOUND PVC PIPELINERS		
71-3.09A(1)(c)	Reel of PVC strip	COC + report
72-16 GABIONS		
72-16.01C	Gabion basket	COC
	PVC coating	COC + identify
75-3 MISCELLANEOUS BRIDGE METAL		
75-3.01C(1)	Anchorage devices	COC
75-3.01C(2) BRIDGE DECK DRAINAGE SYSTEM		
75-3.01C(2)	Fiberglass pipe and fittings	COC
80-3 CHAIN LINK FENCES		
80-3.01C	Protective coating system	COC
	Posts and braces	COC + test results
81 MISCELLANEOUS TRAFFIC CONTROL DEVICES		
81-2 DELINEATORS		
81-2.01C	Metal target plates	COC
	Enamel coating	COC
81-3 PAVEMENT MARKERS		
81-3.01C	Pavement markers	COC
82 SIGNS AND MARKERS		
82-2 SIGN PANELS		
82-2.01C	Aluminum sheeting	COC
	Retroreflective sheeting	COC
	Screened-process colors	COC
	Nonreflective, opaque, black film	COC
	Protective overlay film	COC

* For those materials requiring additional information on or with the COC, see specification.

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
82-5 MARKERS		
82-5.01C	Metal target plates	COC
	Enamel coating	COC
	Retroreflective sheeting	COC
83-3 CONCRETE BARRIERS		
83-3.01C	Type 60K portable concrete barrier	COC or test reports
84-2 TRAFFIC STRIPES AND PAVEMENT MARKINGS		
84-2.01C	Thermoplastic	COC + autho., SDS & data sheet
	Paint	COC + autho., SDS & data sheet
	Glass beads	COC + autho., SDS & data sheet
	Thermoplastic primer	COC + test results
DIVISION X ELECTRICAL WORK		
86-1.01C(6)	Signal heads	COC + test data
	Visors	COC + test data
87-2 LIGHTING SYSTEMS		
87-2.01C	High mast lighting luminaires	COC + test data
90 CONCRETE		
90-1.01C(3)	Cementitious materials	COC + app. signature
	Blended cement	COC + app. signature
90-1.01C(4)	Admixture	COC + authorization
90-1.01C(5)	Curing compound	COC + test samples
90-2 MINOR CONCRETE		
90-2.01C	Minor concrete	COC + weighmaster cert
90-3 RAPID STRENGTH CONCRETE		
90-3.01C(3)	Aggregate	COC + certified weight
	Cementitious materials	COC + certified weight
	Admixtures	COC + certified weight
90-4 PRECAST CONCRETE		
90-4.01C(2) and 90-4.01D(2)(a)	Cementitious materials	COC + app. signature
	Precast members (each)	COC + app. signature
	Curing compound	COC + test samples
94 ASPHALTIC EMULSIONS		
94-1.01C	Asphaltic emulsion	COC + reports

* For those materials requiring additional information on or with the COC, see specification.

Materials Requiring a Certificate of Compliance per Caltrans Standard Specifications

Caltrans 2018 Standard Specifications	Material	Additional Info and/or Attachments Required*
95 EPOXY		
95-1.01C	Epoxy	COC
96 GEOSYNTHETICS		
95-1.01C(1)	Geosynthetic	COC + test samples

* For those materials requiring additional information on or with the COC, see specification.

EXHIBIT 'D'

**SECTION 16.8 "PROJECT FILES" FROM CALTRANS
LOCAL ASSISTANCE PROCEDURES MANUAL**

16.8 Engineer's Daily Reports

Procedures

The local agency must write daily reports to document the work in progress. These daily reports may be written by the construction inspector, the Assistant RE and/or the RE, as project and staffing needs dictate. The daily report must document what work was performed, where and how it was performed, and who performed it. The details must be sufficient so that someone not familiar with the project could re-create the events that occurred and review of the contractor's costs to perform the work in a manner similar to force account. The report should also document significant events or conversations, and activities performed to ensure contract compliance.

The Daily Reports should record the following:

- General Information
 - The date
 - A brief description of the weather

- The printed name and signature of the author
- For each person working on the project:
 - The full name
 - The labor classification
 - The employer
 - The hours worked, broken down by contract item and/or Contract Change (CO) work
- For each piece of equipment working on the project:
 - The make and model (or contractor's ID number)
 - The hours worked, broken down by contract item and/or CO work

Equipment should be identified sufficiently to enable determination of the applicable rental rates and operator's minimum wage. Consider in the design of your daily report form that it is important to know who operated what equipment, as this may affect the wage rate. In some cases, it may be desirable to record dates of arrivals or departures of equipment, as well as idle time for breakdown or other reasons.

The Narrative Portion of the Report should include:

- A description of the contractor's operation
- The location where the work was performed (stations, off sets, depths, etc.)
- Statements made by the contractor or local agency personnel, which are pertinent to the work
- Activities performed by local agency staff to ensure the materials and workmanship complies with the contract specifications
- Sampling
- Acceptance Testing
- Measuring
- Collection of Certificates of Compliance
- Contract Item Quantity supporting information (measurements, tonnage, waste)

The description of the work performed must be sufficient to determine proper labor classification, such as differentiating work performed by a laborer versus work performed by an electrician. Workers must be classified and paid according to the work they actually perform, regardless of union affiliation, other titles, or designations.

See [Exhibit 16-C: Resident and Assistance Engineers Daily Report](#) for an example of both the RE's and Assistant RE's daily report forms used by Caltrans are shown as. The engineer's daily reports discussed herein are required in addition to any extra work reports submitted by the contractor. The daily reports must be kept current and in the project files.

