



# **CITY OF LOS ANGELES**

## Quality Assurance Program **QAP**

Revised July 2014

# QUALITY ASSURANCE PROGRAM

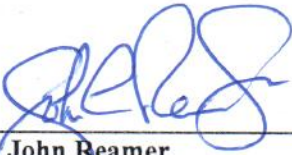
## QAP

### CITY OF LOS ANGELES

REVISION 4

JULY 2014

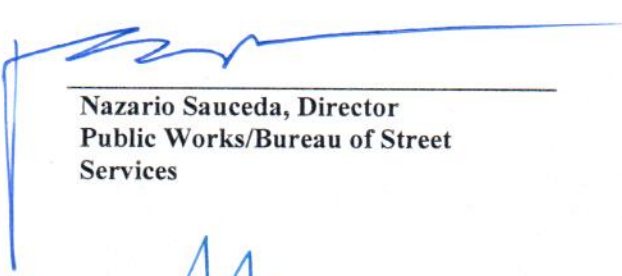
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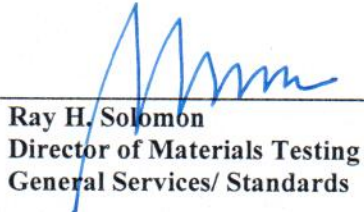
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## 1. INTRODUCTION

The purpose of this document is to provide guidelines for quality assurance on Federal Aid construction projects to ensure City-wide uniformity in calibrating testing equipment, certifying testers, sampling and testing materials, preparing materials records, inspection and maintaining project records.

A **Quality Assurance Program (QAP)** is a series of planned and systematic actions which will ensure that the materials and workmanship incorporated into each Federal Aid project are in conformity with the requirements of the approved plans and specifications, including approved changes.

This all-inclusive revised edition of the QAP for the City of Los Angeles is applicable to Federal Aid projects that are part of the **National Highway System (NHS)** and those that are not (i.e., off the NHS). In the City of Los Angeles, the NHS includes all roads on the Interstate System, and roads on the **State Highway System (SHS)**. The QAP for projects on the NHS that are part or wholly on the SHS is presented in Section 2. For NHS projects off the SHS, the QAP is presented in Section 3. And finally, Section 4 represents the QAP for Federal Aid projects off the NHS.

In all cases, the QAP consists of the following elements designated by the **Federal Highway Administration (FHWA)** and the **California Department of Transportation (Caltrans)**:

- Acceptance Testing Program (ATP)
- Independent Assurance Program (IAP)

Quality Control of materials and products is the responsibility of the contractor. The Bureau of Contract Administration and General Services/Standards Division provide management oversight of the **Acceptance Testing Program**. Standards Division also conducts the **Independent Assurance Program**.



## **2. QUALITY ASSURANCE PROGRAM FOR NHS PROJECTS ON THE SHS**

The QAP documents will consist of:

- The Caltrans Construction Manual
- The Caltrans Independent Assurance (IA) Manual

Construction of the project will be in accord with Caltrans approved plans and specifications, utilizing California Test (CT) Methods or American Association of State Highway and Transportation Officials (AASHTO) methods, or American Society for Testing and Materials (ASTM) International methods.

## **3. QUALITY ASSURANCE PROGRAM FOR NHS PROJECTS OFF THE SHS**

### **3.1 Acceptance Testing Program (ATP)**

The ATP is comprised of periodic unbiased sampling and testing of the construction materials used on Federal-aid projects. Acceptance sampling and acceptance testing, both equally important, constitute the program. Acceptance sampling is done at the manufacturing/processing facility producing the construction material and/or at the construction site where the material is sent for final placement. Such field sampling is done by properly trained personnel, primarily Construction Inspectors of the Bureau of Contract Administration but occasionally by technicians from Standards Division. Acceptance testing is performed by certified personnel on calibrated testing equipment at Standards Division, a comprehensive and licensed Materials Testing Laboratory.

#### **3.1.1 Materials Inspecting and Sampling**

The Materials Control Section of the Bureau of Contract Administration is responsible for the inspection and/or verification of all materials and/or equipment at their source of manufacture or fabrication that are used on Public Works Projects. Included among the materials inspected in the field, sampled and accepted for Acceptance Testing are Asphalt Concrete (AC), Portland Cement Concrete (PCC) and Reinforced Steel. There

are a few City agencies (e.g. Bureau of Street Services) that administer their own in-house materials inspection/sampling program that includes coverage of force account work for resurfacing, concrete and other types of force account construction projects. This is done in coordination with General Services/Standards Division and is in full compliance with state and federal regulations and Caltrans/FHWA expectations for force account work.

The following functions are carried out by Inspectors for the Materials Control section:

1. Approving Asphalt, Concrete and Reinforced Concrete Pipe Plants.
2. Inspecting, sampling and sieve analysis testing of Asphalt Concrete and Recycled Asphalt Concrete at Batch Plants.
3. Inspecting, sampling and performing field testing of Portland Cement mixes (e.g. sieve analysis & slump test) at various Concrete Batch Plants and Casting Yards.
4. Inspecting, sampling and witnessing the testing of pre-stressed concrete pipe, wet cast reinforced concrete pipe, machine made concrete pipe, centrifugally spun reinforced concrete pipe, and Polyvinyl Chloride Lined Reinforced Concrete Pipe.
5. Inspecting, sampling and testing Pre-stressed Concrete Street Light Poles. Loading of poles and testing of reinforcing bars.
6. Shop fabrication inspection includes the following:
  - a. Shop welding of carbon, stainless steel and aluminum. Non-destructive testing of weldments when required by the contract.
  - b. Pressure Vessels and Storage Tanks. Hydrostatic testing.
  - c. Inspecting, sampling and testing Gray Iron Castings.

- d. Inspecting, sampling and testing Hot Dip Galvanizing and anodizing. Testing is performed when required by the contract.
- e. Inspecting, sampling and witnessing the testing of pre-cast and pre-stressed concrete products with regard to strength durability and appearance.
- f. Inspecting, sampling and testing passivation of stainless steel, surface preparation and coating of concrete maintenance hole shafts, cast iron, aluminum, structural and miscellaneous steel. Testing is performed when required by the contract.
- g. Inspecting, sampling and testing various electrical and mechanical equipment. Verifying treatment of components before concealment into finished units.
- h. Inspecting, sampling and testing fiberglass tanks, ducts and fittings.
- i. Frequency of aforementioned sampling and testing is determined by one of the following:
  - Caltrans Quality Assurance Program (QAP) Manual, Appdx D (included herein as Appendix A)
  - Project Specifications
- j. Reviewing all submittals to determine whether shop inspection is required or waived.
- k. Reviewing and approving third party inspection companies if the fabricator is located more than 50 miles outside the geographical limits of the City.



- I. Answering correspondence from the prime contractors. Assigning inspectors to attend pre-construction and pre-fabrication meetings locally or out of town.
  
- m. Reviewing and distributing the Daily Inspection Reports and test results submitted by third-party inspectors on weekly basis.

The material inspection at the source, or the job site, will utilize CT Methods, their ASTM equivalents, AASHTO or other national standards. The substitution of a CT procedure for the appropriate ASTM method is given in Caltrans **Local Assistance Procedures Manual (LAPM)** Sect 16 Exh 16-S, and is included herein as Appendix B. Either the **Certificate of Compliance (COC)**, for materials listed in LAPM Sect 16 Exh 16-T, or the "Evidence of Shop Fabrication" sticker (Yellow Tag) issued by the City of Los Angeles Inspector, may be used to indicate compliance. Examples of forms and markings of approved items are presented in Appendix C. The official roster of the City's "Approved Products and Construction Materials Lists" is accessible from the following Link <http://eng.lacity.org/techdocs/>. Trained Construction Inspectors enforce all appropriate federal regulations and specifications at the project site with a high level of quality assurance, specifically construction and safety regulations, codes and plans. Construction Inspectors are responsible to account for the amount of construction materials entering the site daily. Though measured quantities and materials are recorded daily, the general contractor is paid monthly.

All materials and products entering the construction project will be identified by the contractor completing form CEM 3101 "Notice of Materials to be Used" per LAPM, Sect 16 Exh 16-I, (included herein as Appendix D). The Construction Inspector maintains a material and test "Summary Log" for each material requiring multiple sampling and testing. The "Summary Log", as specified in LAPM Sect 16.14, includes appropriate data such as station location, depth of test sample, approximate quantity of materials represented by the test sample, test results, and the tester. In the event of a test failure, sufficient additional samples will be secured for testing in order to locate the area(s) of failure. Failed materials shall be removed, re-compacted or replaced until

compliance is achieved. Failing tests results require re-testing of the materials with cross references of the re-test to the initial failing test result previously entered in the "Summary Log".

### **3.1.2 Materials Testing**

AT of the construction materials incorporated in NHS projects ensures compliance with contract specifications. AT is performed at the main materials testing agency in the City of Los Angeles, Standards Division. Several 'in-house' labs perform AT in their specialized fields of testing. The Geotechnical Section operates the Compaction Lab (in-field and lab soil testing for in-place density, relative compaction & lab maximum density, etc.) The Geotechnical Section also runs the Foundation & Classification Lab, where testing is done for parameters like Atterberg limits, direct shear, consolidation, permeability, R-Value, and California Bearing Ratio. The Asphalt Lab of the Roads and Highways Section, tests asphalt based paving materials and conducts internationally recognized SHRP Superpave evaluation. The Physical Lab performs compression strength tests of concrete and masonry products, tensile strength tests of steel products, and D-load tests on concrete pipe. The Special Materials Lab conducts tests on more exotic materials, both in the lab (sewer liner products, high strength bolts, coatings, rubber) and in the field (ultrasonic testing of welds, spark testing of sewer pipe coatings).

#### A. Test Methods:

The Methodology of testing conducted in these labs is according to the following recognized standards:

- California Test (CT) Methods
- American Society for Testing and Materials (ASTM) International
- American Association of State Highway and Transportation Officials (AASHTO)

The full extent of testing at Standards Division is shown in Appendix E, showing by lab, material being tested and methodology used.



B. Plans and Specifications:

Approved project plans and specifications shall be one of the following:

- Caltrans Standard Plans and Specifications
- AASHTO, ASTM or other nationally - recognized standard.

The City of Los Angeles will attach all applicable Caltrans reference materials to the project plans and specifications and to the Project Engineer's files.

Standards Division, as per LAPM Sect 16.14, participates in the Correlation Testing Program with:

- **The AASHTO Materials Reference Laboratory (AMRL)**
- **Cement and Concrete Reference Laboratory (CCRL)**
- **Caltrans' own Reference Samples Program (RSP)**

The laboratory and testing equipment used at Standards was chosen for its suitability to the test methods required. This equipment is maintained in good operating condition and calibrated yearly, or as required by applicable standards (e.g. AASHTO R18). Calibration is done by reputable outside companies, using standards directly traceable to the **National Institute of Standards and Technology (NIST)**. Current files of calibration are kept in each laboratory. A master file of all calibrations and any needed repairs are kept in the Accreditation Section of Standards Division to ensure proper tracking of required calibrations.

As a note of interest, the Asphalt Lab undergoes a rigorous and comprehensive biennial evaluation process to earn AMRL accreditation as a certified lab.

C. Sampling Location and Testing Frequency:

The frequency of testing and the location of sampling may be determined by either:

- Caltrans QAP Manual, Appendix D (herein included as Appendix A)
- Project Specifications



For Federally funded force account work, the City of Los Angeles will sample in accord with the guidelines in the Caltrans QAP Manual and Caltrans LAPM, Chapter 16. Appendix F compares the sampling frequencies of construction materials from the Caltrans QAP, the Standard Specifications for Public Works Construction (SSPWC or Greenbook), 2012 edition, and the City of Los Angeles Department of Public Works Additions and Amendments to the Standard Specifications for Public Works Construction (or "Brownbook"), latest edition. The City will use the most stringent among these standards.

When sampling products such as Portland Cement Concrete (PCC), Cement-Treated Base (CTB), Asphalt Concrete (AC) and other such materials, the time of such sampling shall be varied with respect to the time of day insofar as possible, in order to avoid a predictable sampling routine.

D. Certification of Personnel:

Standard Division employs Acceptance testers who are certified by one or more of the following:

- Caltrans District Materials Engineer or the Director of Standards Division
- nationally recognized organizations, such as American Concrete Institute, AASHTO, American Society for Non-Destructive Testing, etc.

The personnel performing AT at Standards shall be qualified by:

- "Certificate of Proficiency as an Acceptance Tester", MR-0111, issued by Caltrans District Materials Engineer or
- by the City of Los Angeles "Certificate of Proficiency in Construction Materials Testing", signed by the Director, Standards Division (see Appendix G and below) or
- certification by the AASHTO Materials Reference Laboratory (ARML)

In case of an extreme emergency or unforeseen circumstances, sampling and

testing may be performed by trained lab personnel who are not certified. Assurances are made of the sampler and tester's competency and every effort is made to use a certified tester as soon as feasible.

### **3.2 Independent Assurance Program (IAP)**

This program is administered by the Independent Assurance (IA) Section of Standards Division. IA monitors the ATP at periodic intervals by:

- Authenticating the Acceptance sampling and testing done at each separate lab in Standards Division at a frequency of about 10-15% of the total workload, per each testing method employed, per project.
- Evaluating the Acceptance sampling and testing personnel by observation (Witness) and split sample (Comparison) testing of the construction material incorporated into each project.
- Verifying the condition of the testing equipment by calibration checks and maintaining calibration records.
- Maintaining an up-to-date collection of reference materials of the testing methods employed (CT Methods, ASTM, AASHTO, etc)
- Certifying trained lab personnel to perform Acceptance sampling and testing in strict compliance with the accepted test methods

IA personnel, though qualified by the same procedure as Acceptance testers, do not perform acceptance sampling and testing. Likewise, to avoid conflict of interest, acceptance sampling and testing personnel do not perform IA sampling and testing. Each time acceptance sampling and testing is witnessed, a report of the test will be produced, using:

- Form MR-0103, "Report of Witness Test", LAPM Sect 16, Exh 16-F or
- IA's own "Witness Test Report" form, customized for each test method.

Any questionable procedure witnessed will be reported immediately to the Project Engineer.



On a random basis, material samples shall be taken at the same point-in-time by both the Acceptance tester and the IA tester. Using similar equipment and procedures, the samples will be separately tested to establish correlation between the two sets of results. Each time such a "Split Sample" test is performed, a report of the test will be produced via

- Form MR-0104, "Corroboration Report", LAPM, Sect 16, Exh 16-G or
- IA's own "Comparison Test Report" customized for the test method.

The results of the Acceptance and IA "Split Sample" tests are corroborated. If discrepancies in test results outside the normal statistical variation exist, the cause(s) are determined and corrective action is taken until a reasonable degree of correlation is established. A report of the findings is placed in the project file and the Director of Standards is notified.

During Witness or Comparison testing, the acceptance testing equipment condition and calibration are checked and the sampling/testing procedures are verified for conformance with project contract specifications. The IA results from Witness or Comparison tests are not used to verify specification compliance on construction projects.

The IA Section also certifies personnel for proficiency in a recognized test method by:

- conducting a stringent written test
- executing a performance exam in the presence of IA personnel
- having the candidate engage in a rigorous one-time oral interview with the Director of Standards.

Upon successful completion, the employee is issued a Certificate of Proficiency, signed by the Director, valid for three years (See Appendix G). Records of certification are kept in the project files and in a master file. The sampling and testing performed by these certified testers is periodically reviewed by IA personnel.



### 3.3 Reporting Test Results

The time period for reporting material test results to the Project Engineer will be in accord with LAPM, Sect 16.14, Pg 16-34, "Reporting Test Results". Specifically for certain materials and locations, the following represents goals in reporting test results:

- When the aggregate is sampled at materials plants, test results for Sieve Analysis, Sand Equivalent and Cleanness Value should be submitted to the Project 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 Project 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 Project Engineer within 72 hours after sampling.
- When soils and aggregates are sampled at the job site, test results for "R" Value and Asphalt Concrete Extraction should be submitted to the Project Engineer within 96 hours after sampling.

Acceptance test results may be reported to the Construction Inspector, the Bureau of Street Services Superintendent, or the Project Engineer by facsimile or phone. A copy of the final test report, signed by the Director of Standards Division, may also be mailed to the respective interested party. The reporting of AT test results for tests not performed by the Project Engineer staff shall be done on an expedited basis such as by fax or telephone.

Nowadays, immediate access to these reports is provided on websites. A City Intranet site, developed by Standards Division, allows Bureau of Street Services personnel the ability to view reports involving their projects. Another portal, on the internet, was developed as a collaborative effort between the Bureau of Contract Administration, the Bureau of Engineering and Standards Division; here access to AT results (<http://eng.permits.lacity.org/LabTestResults/>) is available for Inspectors, Project Engineers and even private contractors.

### **3.4 Records**

The Inspector of Public Works is the custodian of all records relating to public works construction contracts awarded by the Board of Public Works and all other construction contracts administered by the Bureau of Contract Administration. Project records relating to all inspection and contract compliance matters are kept by the Bureau of Contract Administration (Con Ad). Separate agencies that administer their own in-house materials control maintain their own records. Records of field tests taken by Con Ad Inspectors, are kept at the job site by the Inspector throughout the active term of the contract. The "Summary Log" (as specified in LAMP Sect 16.14) and material certificates are kept in the project files by Con Ad Inspectors. In addition, the project files incorporate all material records of samples and tests, material releases, etc as per LAPM Sect 16.8 "Project Files". The project files, project specifications, changes to contract, Inspector's Daily Records, progress payments, recapitulation of contract time and other related correspondence are available for review, upon request, at the project site. The project files are retained for a term that exceeds State and Federal requirements.

Records of Acceptance Testing such as gradation, sub-grade and sub-base compaction, AC samples and cores, reinforcement steel and concrete are kept at Standards Division. All records relating to IA sampling and testing are kept at the Independent Assurance Unit, Standards Division.

### **3.5 Project Certification**

Upon completion of a Federal-aid project, a "Materials Certificate" shall be completed by the Project Engineer. The City 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 City's construction records. The Project Engineer shall sign the certificate. All materials incorporated into 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 (as per Appendix K of the Caltrans QAP Manual).



#### **4. QUALITY ASSURANCE PROGRAM FOR FEDERAL-AID PROJECTS OFF THE NHS**

The QAP for this category of projects will largely follow that already presented in “Section 3 – Quality Assurance Program for NHS Projects off the SHS”. In order to avoid unnecessary duplication, only material that is different from that existing in Section 3 will be outlined below. The rest of the protocol reads, word by word, category by category, exactly the same as Section 3. The following new Section 4 material stands as corrections/additions to the Section 3 text (In order to distinguish the new material from old, new material will be *italicized*):

##### **4.1 Acceptance Testing Program (ATP)**

(same as Section 3.1)

##### **4.1.1 Materials Inspecting and Sampling**

There are a few City agencies (e.g. Bureau of Street Services) that administer their own in-house materials inspection/sampling program that includes coverage of force account work for resurfacing, concrete and other types of force account construction projects. This is done in coordination with General Services/Standards Division and is in full compliance with state and federal regulations and Caltrans/FHWA expectations for force account work.

The following functions are carried out by Inspectors working for the Materials Control section:

*Under Section 3.1.1 Item 6: Correction, should read: ‘Shop fabrication inspection in compliance with the latest Standard Specification for Public Works Construction (SSPWC or Greenbook) as modified by the City of Los Angeles Department of Public Works Additions and Amendments to the Standard Specifications for Public Works Construction (“Brownbook”) and Contract Documents, includes the following:*

*Under Section 3.1.1 Item 6.i. Frequency of aforementioned sampling and testing is determined by: (Should read, in addition to existing entries):*



- *SSPWC (Greenbook), 2012 Edition, as modified by the L.A. "Brownbook", latest edition*
- *Public Works Inspectors Manual, (PWIM or Bluebook) sampling schedule*
- *Applicable Codes and Reference Documents*

Replace the first sentence of the paragraph after item 6m with the following: The material inspection at the source, or the job site, will utilize CT Methods, their ASTM equivalents, AASHTO, SSPWC (*Greenbook*) as modified by the L.A. "*Brownbook*" or the PWIM (*Bluebook*).

On Page 6, the first sentence of the bottom paragraph should read: All materials and products entering the construction project will be identified by the contractor *by either:*

- *form CEM 3101 "Notice of Materials to be Used" per LAPM, Sect 16, Exh 16-I, (included herein as Appendix D) or*
- *SSPWC (Greenbook), as modified by the L.A. "Brownbook".*

*In either case the material type and source of supply (where material can be Inspected) will be identified.*

#### **4.1.2 Materials Testing**

(same as Section 3.1.2 except add the following):

##### A. Test Methods:

The Methodology of testing conducted in these labs is according to *either of the following* (add to the list):

- *SSPWC (Greenbook), as modified by the L.A. "Brownbook"*
- *Project related codes/specifications*

##### B. Plans and Specifications:

Approved project plans and specifications shall be one of the following (add to the list):

- *SSPWC (Greenbook), as modified by the L.A. "Brownbook"*
- *Project related codes/specifications*

##### C. Sampling Location and Testing Frequency:

The frequency of testing and the location of sampling may be determined by either: (add to the list):

- *PWIM (Bluebook), Plate 28.*

*The City Inspector will make proper selection after consulting with the Project Engineer when there is a frequency number difference between the Caltrans Table and the City PWIM (Bluebook), except for force account work, which will have a different protocol than the PWIM (Bluebook), but will be in compliance with Caltrans and FHWA expectations for force account work.*

D. Certification of Personnel

(same as Section 3.1.2D)

**4.2 Independent Assurance Program (IAP)**

(same as Section 3.2)

**4.3 Reporting Test Results**

The first sentence should read: The time period for reporting test results to the Project Engineer will be in accord with *the timetable shown in Table 1 (see page17).*

**4.4 Records**

The middle sentence, first paragraph, should read: The "Summary Log" (as specified in LAPM, Sect 16.14) *or the City Inspector's "Daily Inspection Log"* and the material certificates (*and/or the COC, and/or the "Yellow Tag"*) are kept in project files by Con Ad Inspectors, except for force account projects, which follow a different protocol per the procedures established by the City agencies (e.g. Bureau of Street Services) administering their own in-house materials inspection/sampling program. Record-keeping protocol for force account projects will take into consideration the different nature of force account construction and will be in compliance with Caltrans and FHWA expectations for force account work.

**4.5 Project Certification**

(same as Section 3.5)



**TABLE 1*****TIMETABLE FOR REPORTING TEST RESULTS***

<b>Material</b>	<b>Test</b>	<b>Time</b>
Soils base, fill, CMB, CAB, etc.	Sieve Analysis Sand Equivalent and Compaction	1 working day
Aggregate-AC	Sieve Analysis (Wet & Dry)	1 working day
Soils	Atterberg Limits and Sieve Analysis	2 working days
Asphalt Concrete	Marshall Volumetric Analysis	2 working days
Aggregate-PCC	Sieve Analysis (Wet & Day), Specific Gravity, LA Rattler, Organic Impurities, Sand Equivalent	2 working days
Asphalt-Slurry Seal	Slurry Seal Design & Tests	3 working days
Soils-Subgrade & Base	"R" Value	4 working days
Concrete Cylinders, Mortar, Grout, etc.	Compressive Strength	5 working days
Steel Reinforcing Bars, Wire Cables, Couplers, etc.	Tensile Strength	5 working days
Aggregate-PCC	Sieve Analysis (Wet & Dry), Specific Gravity, LA Rattler, Organic Impurities, Sand Equivalent	2 working days

## 5. REFERENCES

1. Caltrans Construction Manual, May 2014
2. Caltrans Independent Assurance (IA) Manual, July 2005
3. Caltrans, Index of California Test Methods:  
<http://tresp.dot.ca.gov/ctms/mindex.html>
4. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Transportation Materials and Methods of Sampling And Testing, 2013 Edition or as referenced
5. American Society for Testing and Materials (ASTM) International, 2014 Edition or as referenced
6. Caltrans Quality Assurance Program (QAP) Manual for use by Local Agencies, Feb 2009 (partially revised Jan 2011)
7. Caltrans Local Assistance Procedures Manual (LAPM), Apr 2009 (partially revised Oct 2012)
8. Standard Specification for Public Works Construction, (SSPWC or Greenbook), 2012 edition, or as referenced.
9. City of Los Angeles Department of Public Works Additions and Amendments to the Standard Specifications for Public Works Construction ("Brownbook"), 2011 edition, or as referenced.
10. City of Los Angeles Public Works Inspector's Manual (PWIM or Bluebook), latest edition.



## APPENDIX A

*ACCEPTANCE SAMPLING AND TESTING FREQUENCIES*

*(CALTRANS Q.A.P. MANUAL, APPENDIX D)*



## Appendix D - Acceptance Sampling and Testing Frequencies

Note: It may be desirable to sample and store some materials. If warranted, testing can be performed at a later date.

### Portland Cement (Hydraulic Cement)

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Cement/fly ash (Sampling only)	8-lb. sample	If possible, take a least one sample per job, even if the material is accepted based on a Certificate of Compliance.	ASTM D75, C494 CT 125 AASHTO T127, M85, M295	Standard for sampling hydraulic cement or fly ash.
Cement (Testing Only)	8-lb. sample	If the product is accepted based on a Certificate of Compliance, testing is not required. If the product is not accepted using a Certificate of Compliance, test at least once per job.	ASTM C109 CT 515 AASHTO T106	If testing appears warranted, fabricate six 2-in. mortar cubes using the Portland (or hydraulic cement). Test for compressive strength.

### Portland Cement Concrete (Hydraulic Cement Concrete)

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Aggregate for Hydraulic Cement Concrete (Sampling & Testing)	50-lb. sample	Take one aggregate sample for each 1000 cu. yd. of PCC/HCC concrete. Test at least one sample per job.	ASTM D75 CT 125 AASHTO M6, T2, M80	Sample aggregate from belt or hopper (random basis).
Water (Sampling & Testing)	Take a two-quart sample using a clean plastic jug (with lining) and sealed lid. Sample at the point of use.	If the water is clean with no record of chlorides or sulfates greater than 1%, no testing is required. If the water is dirty do not use it. Test only when the chloride or sulfates are suspected to be greater than 1%.	CT 405, CT 422, CT 417 AASHTO R23	If testing appears warranted, test for chlorides and sulfates.





## Appendix D (continued)

### Portland Cement Concrete (Hydraulic Cement Concrete) – Continued

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description of Comments
Air Entraining Admixtures (Sampling & Testing)	Take a one-quart sample using a clean, lined can or plastic bottle, if liquid. If powder, take a 2.5 lb. sample.	If the product is accepted based on a Certificate of Compliance, testing is not required. Take one sample per job. Prior to sampling, check with Caltrans (METS) for acceptable brands and dosage rates.	ASTM C233 AASHTO M154, T157, C260	If testing appears warranted, test for sulfates and chlorides Admixtures with sulfates and chlorides greater than 1% should not be used.
Water Reducers or Set Retarders (Sampling & Testing)	If liquid, take a 1-qt. sample using a clean plastic can. If powder, take a 2.5 lb. sample.	If the product is accepted based on a Certificate of Compliance, no testing is required. If not, test once per job. Prior to using this product, please check with Caltrans (METS) for acceptable brands and dosage rates.	ASTM C494 AASHTO M194	If testing appears warranted, test for sulfates and chlorides. Admixtures with sulfates and chlorides greater than 1% should not be used.
Freshly-Mixed Concrete (Sampling)	Approx. 150lb. (or 1 cu. ft.) near mixer discharge.	When tests are required, take at least one sample for each 500 to 1000 cu. yd. of PCC/HCC.	ASTM C172, C685 CT 539 AASHTO T141, M157	This describes a method to sample freshly-mixed concrete.
Freshly-Mixed Concrete (Testing)	Approx. 150 lb/ (or 1 cu. ft.) near mixer discharge.	On projects with 500 cu. yd., or more, test at least one sample per job.	ASTM C143 AASHTO T119	This test determines the slump of the freshly-mixed concrete.
Freshly-Mixed Concrete (Testing)	Approx. 150 lb/ (or 1 cu. ft.) near mixer discharge	On projects with 500 cu. yd., or more, test at least one sample per job.	ASTM C360 CT 533	This test determines the ball penetration of the freshly-mixed concrete.
Freshly-Mixed Concrete (Testing)	Approx. 150 lb/ (or 1 cu. ft.) near mixer discharge	On projects with 500 cu. yd., or more, test at least one sample per job.	ASTM C231 CT 504 AASHTO T152	This test determines the air content of freshly-mixed concrete (pressure method).
Freshly-Mixed Concrete (Testing)	Approx. 150 lb/ (or 1 cu. ft.) near mixer discharge	On projects with 500 cu. yd., or more, test at least one sample per job.	ASTM C138 CT 518 AASHTO T121	This test determines the unit weight of freshly mixed concrete.



## Appendix D (continued)

### Portland Cement Concrete (Hydraulic Cement Concrete) – Continued

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Freshly-Mixed Concrete (Testing)	Approx. 150 lb/ (or 1 cu. ft.) near mixer discharge	Fabricate at least two concrete cylinders per project. Test for compressive strength at least once for each 500 to 1,000 cu. yd. of structural concrete.	ASTM C39 CT 521 AASHTO T22	This test is used to fabricate 6" x 12" concrete cylinders. Compressive strengths are determined, when needed.
Freshly-Mixed Concrete (Testing)	Approximately 210 lb. of concrete are needed to fabricate three concrete beams.	One sample set for every 500 to 1,000 cu. yd. of concrete.	ASTM C78 CT 31 AASHTO T97 & T23	This test is used to determine the flexural strength of simple concrete beams in third-point loading

### Soils and Aggregates

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Aggregate (Sampling)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D75 CT 125 AASHTO T2	This test describes the procedures to sample aggregate from the belt or hopper (random basis).
Fine Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM C128 CT 208 AASHTO T84	This test determines the apparent specific gravity of fine aggregates for bituminous mixes, cement treated bases and aggregate bases.
Fine Aggregate (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM C128 CT 207 AASHTO T84	This test determines the bulk specific gravity (SSD) and the absorption of material passing the No. 4 sieve.
Coarse Aggregate (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	CT 206	This test determines the cleanness of coarse aggregate.



**Appendix D (continued)**
**Soils and Aggregates - Continued**

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Coarse Aggregate (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM C127 CT 227 AASHTO T85	This test determines the specific gravity and absorption of coarse aggregate (material retained on the No. 4 sieve).
Soils and Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM C136 CT 202 AASHTO T27	This test determines the gradation of soils and aggregates by sieve analysis.
Soils and Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D2419 CT 217 AASHTO T176	This test determines the Sand Equivalent of soils and aggregates.
Soils and Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM C117 AASHTO T11	This test determines the gradation for materials finer than the No. 200 sieve (by washing method).
Soils and Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D3744 CT 229 AASHTO T210	This test determines the Durability Index of soils and aggregates.
Soils and Aggregates (Testing)	One 50-lb. sample	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D2844 CT 301 AASHTO T190	This test determines the Resistance Value (R-) and expansion pressure of compacted materials.
Soils and Aggregates (Testing)	One random location for every 2,500 sq. ft.	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D2922 CT 231 AASHTO T238	This test determines field densities using the nuclear gage.
Soils and Aggregates (Testing)	One random location for every 2,500 sq. ft.	Take one sample for every 500 to 1,000 tons of materials. Test at least one sample per project.	ASTM D3017 CT 231 AASHTO T239	This test determines the water content using the nuclear gage.





## Appendix D (continued)

### Asphalt Binder

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Asphalt Binder (Sampling)	One 0.5-gal. sample placed in a clean, sealed can.	Sample once per job at the asphalt concrete plant.	CT 125 ASTM D 979 AASHTO T 168, T48	This procedure describes the proper method to sample the asphalt binder.
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Sample once per job at the asphalt concrete plant.	ASTM D92, D117 AASHTO T 48	This test determines the flash point of the asphalt binder (by Cleveland open cup).
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D2872 & D92 CT 346 AASHTO T240 & T48	This test determines the rolling thin-film oven test (RTFO).
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D2042 AASHTO T44	This test determines the solubility of asphalt material in trichloroethylene.
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D2171 AASHTO T202	This test determines the dynamic viscosity, (absolute viscosity of asphalt @ 140 degrees F by the Vacuum Capillary Viscometer Poises).
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D5 AASHTO T49	This test determines the penetration of bituminous material @ 77 degrees F and percentage of original penetration from the residue.
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D113 AASHTO T51	This test determines the ductility of asphalt @ 77 degrees F.
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D2170 AASHTO T201	This test determines the kinematic viscosity of asphalt @275 degrees F (Centistoke).



## Appendix D (continued)

### Asphalt Binder - Continued

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D2171 AASHTO T202	This test determines the dynamic viscosity. (absolute viscosity of asphalt @ 140 degrees F by the Vacuum Capillary Viscometer Poises).
Asphalt Binder (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D36 AASHTO T53	This test determines the softening point of asphalt.

### Asphalt Emulsified

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Emulsified Asphalt (Sampling)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D140, D979 CT 125 AASHTO T 40, T168	This test describes the procedure to sample the emulsified asphalt.
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D244 AASHTO T59	This test determines the sieve retention of emulsified asphalt.
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D244 AASHTO T59	This test determines the weight per gallon of emulsified asphalt.
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D244 AASHTO T59	This test determines the penetration of the emulsified asphalt.
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D244 CT 330 AASHTO T59	This test determines the residue @ 325 degrees F evaporation of emulsified asphalt.





## Appendix D (continued)

### Asphalt Emulsified - Continued

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D4402 AASHTO T201	This test determines the Brookfield viscosity.
Emulsified Asphalt (Testing)	One 0.5-gal. sample placed in a clean, sealed can.	Obtain one sample at the asphalt concrete plant for each 1,000 tons of asphalt concrete placed.	ASTM D88 AASHTO T72	This test determines the Saybolt-Furol viscosity of emulsified asphalt @ 77 degrees F (seconds).

### Hot Mix Asphalt (Asphalt Concrete) – Concrete

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Asphalt Concrete (Sampling)	Obtain one 30-lb. sample each day of production	Obtain one sample at the asphalt concrete plant for each 5,000 tons of asphalt concrete placed.	ASTM D75, D140, D979 CT 125 AASHTO T 40, T168	This test describes the procedure to sample the asphalt concrete.
Asphalt Concrete (Testing)	4" x 8" cores	Take one 4" x 8" core for every 500 ft of paved roadway.	ASTM D1188, D1560, D1561, D5361 CT 304 AASHTO T246, T247	This test determines the field density of street samples.
Asphalt Concrete (Testing)	Obtain one 30-lb. sample for each day of production	Obtain one sample for every five cores taken.	ASTM D1188, D1560, D1561, D5361 CT 304 AASHTO T246, T247	This test determines the laboratory density and relative compaction of asphalt concrete.
Asphalt Concrete (Testing)	4" x 8" cores	Obtain one sample for every five cores taken.	ASTM D2726, D1188, D5361	This test determines the specific gravity of compacted bituminous mixture dense-graded or non-absorptive.





## Appendix D (continued)

### Hot Mix Asphalt (Asphalt Concrete) –Continued

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Asphalt Concrete (Testing)	One 30-lb sample	Obtain one sample for every 1,000 tons of asphalt concrete.	ASTM D1559 AASHTO T245	This test determines the resistance to plastic flow of prepared mixes as determined by the Marshall Method.
Asphalt Concrete (Testing)	One 30-lb sample	Obtain one sample for every 1,000 tons of asphalt concrete.	ASTM C117, D2172 (use Method B) AASHTO T164	This test determines the screen analysis of aggregates recovered from asphalt materials.
Geotextile Fabric (Placed Under the Asphalt Concrete) (Testing)	One 12 ft. x 3 ft. sample	Obtain one sample per job.	ASTM D4632 AASHTO M288	This test determines the weight per sq. yd. and grabs strength of geotextile fabrics.
Asphalt Concrete (Testing)	Sample any test location (random basis)	Obtain one sample for every 1,000 tons of asphalt concrete.	ASTM D2950 CT 375	This test determines the nuclear field density of in-place asphalt concrete.
Asphalt Concrete (Testing)	One 10-lb sample	Obtain one sample during every day of production.	ASTM D1560, D1561 CT 366 AASHTO T246, T247	This test determines the stability value of asphalt concrete.
Slurry Seals (Sample)	One 0.5 gal. sample in a clean, dry plastic container.	Obtain one sample per truck	ASTM D979 CT 125 AASHTO T 40, T168	This test describes the procedure for sampling the slurry seal.
Aggregate for Slurry Seals (Testing)	One 30-lb. sample.	Obtain at least one sample per project from the belt or hopper or stockpile and test for Sand Equivalent	ASTM D2419 CT 217 AASHTO T176	This test determines the Sand Equivalent of aggregates.



### Appendix D (continued)

#### Slurry Seals

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Aggregate for Slurry Seals (Testing)	One 30-lb. sample.	Obtain at least one sample per project from the belt, hopper, or stockpile and test for sieve analysis of fine sand.	ASTM C117 AASHTO T11	This test determines the sieve analysis of fine sand (gradation of materials finer than No. 200 sieve by wash grading).
Slurry Seals (Testing)	One 0.5 gal. sample in a clean, dry plastic container.	Test one sample per project and test for Abrasion.	ASTM D3910	This test determines the Wet Track Abrasion Test (2) (WTAT).

#### Steel

Materials to be Sampled or Tested	Sample Size	Sampling/Testing Frequency	Typical Test Methods	Description or Comments
Steel Strand (Testing)	Sample strand at various sizes.	This item may be accepted using a Certificate of Compliance. Sample and test at least two steel strands per job when a Certificate of Compliance is not used.	ASTM A370, A416, E328 AASHTO T244	This test determines the tensile strength of uncoated seven-wire stress-relieved strand for pre-stressed concrete.
Steel Rebar (Testing)	Sample rebar at various sizes.	This item may be accepted using a Certificate of Compliance. Sample and test at least two steel rebar per job when a Certificate of Compliance is not used.	ASTM A615, A370 AASHTO T244	This test determines the steel reinforcement bar tensile strength and bend capability.

**APPENDIX B**

***CALTRANS TEST METHOD - ASTM TEST METHOD***

***CONVERSION CHART***

***TESTING PROCEDURES***

***(CALTRANS LAPM, EXH 16-S)***



**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 Standards	TEST PROCEDURE	NOTE S
105			Calculations Pertaining to Gradings and Specific Gravities	2
125	D75 D979	4.02 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 C117	4.02 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 D1557	4.08 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 Drop	11
217			Sand Equivalent (only authorized method per Caltrans 07, District Materials Engineer)	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 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 (Method "E")	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 Method	
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

**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).

CT M	ASTM	Book of Standards	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	<i>1</i>
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)	<i>1</i>
528			Freeze Thaw Resistance of Aggregates in Air-Entrained Concrete	<i>1</i>
529			Proportions of Coarse Aggregate in Fresh Concrete	<i>1</i>
530			Determining the Effect of H <sub>2</sub> O-Reducing and Set-Retard. Admix. Drying Shrinkage PCC	<i>1</i>
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)	<i>1</i>
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.)	<i>1</i>



### 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).

## APPENDIX C

### *FORMS AND MARKINGS OF APPROVED MATERIALS*



# Batch Plant Inspector's Form for Sieve Analysis on Asphalt Aggregate

Form 1007-B-8-76  
 Department of  
 Public Works

CITY OF LOS ANGELES

Bureau of Contract  
 Administration

## ASPHALT PLANT INSPECTOR'S DAILY REPORT

JOB TITLE		JOB NO.	
DATE	MATERIAL SOURCE	PLANT NAME	
SPEC. NO.	SAND	PLANT LOCATION	
TYPE OF MATERIAL	ROCK	CONTRACTOR	
TOTAL TONS	FILLER	FIELD INSP.	
PLANT INSP.	L.A.	HRS.	SCALE INSP.
			HRS.

### SCREEN ANALYSIS

	No. 4 Bin	No. 3 Bin	No. 2 Bin	No. 1 Bin	Filler	Total Agg.	A. C.
% of Mix						100%	%
Wt. in Lbs.							
% Passing 1 1/2 Inch	100	100	100	100	100	Mix %	Ideal 100%
1"		100	100	100	100		
3/4"		100	100	100	100		
1/2"			100	100	100		
3/8"			100	100	100		
No. 4				100	100		
No. 8					100		
No. 30					100		
No. 50					100		
No. 200							

ASPHALT	PLANT SAMPLE TANK NO.	Notes:
	CERTIFICATE OR B.L. No.	
	CERTIFIED VISCOSITY	
	TRUCK MIX SAMPLE LOAD NO.	

# Batch Plant Inspector's Form for Sieve Analysis on Concrete Aggregate

Form 1007-A

CITY OF LOS ANGELES

Department of  
Public Works

Bureau of  
Contract Administration

JOB NO.
DATE

## CONCRETE PLANT INSPECTORS DAILY REPORT

JOB TITLE						
SUPPLIER & PLANT LOCATION				CONCRETE CONTRACTOR		
MATERIAL SOURCE:	CEMENT	SAND		ROCK		
MIX DATA	SPECS.	CONCRETE CLASS		TOTAL C.YDS. PRODUCED:		
ADMIXTURE, BRAND & QUANTITY						
Aggregate per C.Y.	No. 2	No. 3	No. 4	Sand	Total Mix	WATER (Gals.)
% of mix					100%	MAX. ALLOWABLE
# Dry Weight						IN AGGREGATE
% Moisture						MAX. ADDED
# Moisture						CEMENT
# Batch Weight						
SCREEN ANALYSIS (% Passing)					DATE LAST ANALYSIS:	
2 Inch	100	100	100	100		SPECS. 100%
1½ Inch		100	100	100		MIN. MAX.
1 Inch			100	100		
¾ Inch			100	100		
¾ Inch				100		
No. 4						
No. 8						
No. 16						
No. 30						
No. 50						
No. 100						
No. 200						
CEMENT SAMPLE				FIELD INSPECTOR		
Notes				PLANT INSPECTOR		HOURS



Notes Over ( )



# Concrete & Asphalt Batch Plant Form #1101 (both sides)

Form 1101 (Rev. 4/75)

City of Los Angeles  
DEPARTMENT OF PUBLIC WORKS  
Bureau of Contract Administration  
**PLANT INSPECTOR'S REPORT  
TO FIELD INSPECTOR**

**INSTRUCTIONS TO PLANT INSPECTOR:**  
Fill out, attach to load ticket and send to Field Inspector with first load.

PLANT NAME \_\_\_\_\_ DATE \_\_\_\_\_

PLANT LOCATION \_\_\_\_\_

CLASS OF CONCRETE OR TYPE OF ASPHALT PAVING MIX \_\_\_\_\_

FOR CONCRETE MIXTURES

BRAND OF ADMIXTURE _____	AMOUNT OF ADMIXTURE PER SACK _____
--------------------------	------------------------------------

PLANT INSPECTOR \_\_\_\_\_

REMARKS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

INSTRUCTIONS TO FIELD INSPECTOR: FILL OUT REVERSE SIDE AND RETURN TO PLANT INSPECTOR IMMEDIATELY.



**INSTRUCTIONS TO FILED INSPECTOR:**  
Fill out this side and return to Plant Inspector immediately.

JOB TITLE \_\_\_\_\_

\_\_\_\_\_

JOB NO. _____	LETTER CODE _____	SPECIFICATIONS _____
---------------	-------------------	----------------------

( CONCRETE ) ( ASPHALT ) USED FOR \_\_\_\_\_

CONTRACTOR \_\_\_\_\_

FIELD INSPECTOR \_\_\_\_\_

NOTES \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Rubber acceptance stamp for Reinforced Concrete Pipe

**BATCH NO.  
INSPECTOR  
APPROVED  
CITY OF L.A.**

Indent stamp for cast iron Maintenance Holes rings & covers

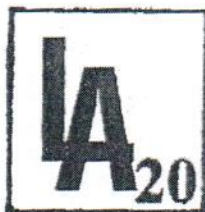
**LA**



Rubber acceptance stamp for precast concrete products i.e.  
Maintenance Holes shafts, Street light & Traffic signal pullboxes,  
Street light Poles.

**APPROVED  
CITY OF L.A.**

Rubber acceptance stamp for miscellaneous coated &  
galvanized items. Each shop inspector has a different number



**“Evidence of Shop Fabrication” sticker (Yellow Tag). Indicates the approval of the item(s) and the release to the next stage of fabrication (i.e. from welding shop to the galvanizers) or ultimately to the Project site.**

78-1316a (R 2/93)

CITY OF LOS ANGELES

BUREAU OF CONTRACT ADMINISTRATION

**INSPECTED**

Nº 58937



W.O. No. \_\_\_\_\_

FABRICATION  WELDED  COATING

GALVANIZED  ANODIZED  OTHER

DESCRIPTION OF ITEMS

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

INSPECTOR \_\_\_\_\_

DATE \_\_\_\_\_

DEPARTMENT OF PUBLIC WORKS



**APPENDIX D**

**NOTICE OF MATERIALS TO BE USED**

**(CALTRANS LAPM, EXH 16-I)**





### INSTRUCTIONS TO CONTRACTOR

Section 6 of the Standard Specifications states that the contractor shall furnish the Resident Engineer a list of the contractor's sources of materials and the locations at which those materials will be available for inspection. The list shall be submitted on an agency form and shall be furnished to the Resident Engineer in sufficient time to permit inspecting and testing of materials to be furnished from the listed source in advance of their use.

In order to avoid delay in approval of materials, the Department of Transportation must receive notice as soon as possible.

Please comply with the following as closely as possible:

The Contract number and job limits should be the same as appears on the Special Provisions.

The column headed "Contract Item No." should show all the item numbers for which the material is to be used.

The column headed "Material Type" should be a description of the material and not necessarily the name of the contract item.

The column headed "Name and Address of Inspection Site" should be that of the actual source of supply and not subcontractor or jobber.

If the sources of all materials are not known at the beginning of a Contract, report those known. Supplemental "Notices of Materials to Be Used" should be submitted for the others as soon as possible thereafter. Do not delay submitting the original notice until all information is known.

All changes in kinds and/or sources of materials to be used should be reported on supplemental "Notices of Materials to Be Used" immediately.

Retain your copy and mail all other copies to the Resident Engineer.

Note: When placing orders for materials that required inspection prior to shipment, be sure to indicate on your order that State inspection is required.

## APPENDIX E

### *EXTENT OF TESTING*



**PHYSICAL LABORATORY (Concrete, Masonry and Steel):**

Test Method		Material
Calif. Test 205	Method for Determining Percentage of Crushed Particles	Aggregate
Calif. Test 207	Specific Gravity and Absorption of Fine Aggregate	Aggregate
Calif. Test 214	Soundness of Aggregate by Use of Sodium Sulfate	Aggregate
Calif. Test 515	Method for Testing Relative Mortar Strength of Portland Cement Concrete Sand	Aggregate
Calif. Test 670	Method of Tests for Mechanical and Welded Reinforcing Splices	Steel Splices
ASTM A82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement	Steel Wire
ASTM A185	Standard Specification for Steel Welded Wire, Fabric	Steel Wire
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	Steel Products
ASTM A416	Standard Specification for Steel Strand, Uncoated Seven-Wire for Pre-stressed Concrete	Steel Wire
ASTM A496	Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement	Steel Wire
ASTM A615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	Steel Wire
ASTM A617*	Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement *	Steel Bars
ASTM A706*	Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement *	Steel Bars
ASTM A722	Standard Specification for Uncoated High-Strength Steel Bar for Pre-stressing Concrete	Steel Bars

\*Physical Laboratory participates in the Cement and Concrete Reference Laboratory (CCRL) Proficiency Samples Program.

**PHYSICAL LABORATORY (Concrete, Masonry and Steel) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C31	Making and Curing Concrete Specimens in the Field	Concrete
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens	Concrete
ASTM C40	Organic Impurities in Fine Aggregate	Aggregate
ASTM C42	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	Concrete
ASTM C62	Standard Specification for Building Brick	Vitrified Clay Brick and Tile
ASTM C67	Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile	Brick and Structural Clay Tile
ASTM C78	Flexural Strength of Concrete (Using Simple Beam with Third Point Loading)	Concrete
ASTM C88	Standard Test Method for Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate	Aggregate
ASTM C90	Standard Specification for Hollow Load Bearing Concrete Masonry Units	Concrete Masonry Block
ASTM C109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch cube specimens)	Cement
ASTM C117	Materials Finer than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing	Aggregate
ASTM C127	Specific Gravity and Absorption of Coarse Aggregate	Aggregate
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	Aggregate
ASTM C136	Sieve Analysis of Fine and Coarse Aggregate	Aggregate
ASTM C140	Method of Sampling and Testing Concrete Masonry Units	Masonry



**PHYSICAL LABORATORY (Concrete, Masonry and Steel) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C143	Slump of Hydraulic Cement Concrete	Concrete
ASTM C150	Standard Specification for Portland Cement	Cement
ASTM C151	Standard Test Method for Autoclave Expansion of Portland Cement	Cement
ASTM C172	Sampling Freshly Mixed Concrete	Concrete
ASTM C173	Standard Test for Air Content of Freshly Mixed Concrete by the Volumetric Method	Concrete
ASTM C188	Density of Hydraulic Cement	Cement
ASTM C191	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle	Cement
ASTM C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory	Concrete
ASTM C216	Standard Specification for Facing Brick	Vitrified Clay Brick
ASTM C231	Standard Method for Air Content of Freshly Mixed Concrete by Pressure Method	Concrete
ASTM C266	Standard Test Method for Time of Setting of Hydraulic Cement Paste by Gillmore Needle	Cement
ASTM C289	Method for Potential Reactivity of Aggregate (Chemical Method)	Aggregate
ASTM C301	Standard Methods of Testing Vitrified Clay Pipe	Sewer Pipe
ASTM C332	Standard Specification for Lightweight Aggregate for Insulating Concrete	Aggregate
ASTM C495	Standard Test Method for Compressive Strength of Lightweight Insulating Concrete	Concrete
ASTM C497	Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile	Concrete Pipe



**PHYSICAL LABORATORY (Concrete, Masonry and Steel) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C617	Capping Cylindrical Concrete Specimens	Concrete
ASTM C652	Standard Specification for Hollow Brick Hollow Brick	Vitrified Clay
ASTM C702	Standard Practice for Reducing Field Samples of Aggregate to Testing Size	Aggregate
ASTM C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry	Mortar
ASTM C1019	Standard Test Method for Sampling and Testing Grout	Grout
ASTM C1107	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)	Grout
ASTM D75	Standard Practice for Sampling Aggregates	Aggregate
ASTM D4791	Standard Test Method for Flat or Elongated Particles in Coarse Aggregate	Aggregate
ASTM E447	Test Method for Compressive Strength of Masonry Prisms	Masonry
ACI 318 - 12.14.3	Building Code Requirements for Structural Concrete – Mechanical and Welded Splices	Steel Splices
UBC Std. No. 24-26	Test Method for Compressive Strength of Masonry Prisms	Masonry

**SOILS LABORATORY (Compaction, Classification and Foundation):**

Test Method		Material
Calif. Test 202	Sieve Analysis of Fine and Coarse Aggregates	Soils
Calif. Test 203	Mechanical Analysis of Soils	Soils
Calif. Test 204	Plasticity Index of Soils	Soils
Calif. Test 209	Specific Gravity of Soils	Soils
Calif. Test 216	Relative Compaction of Untreated and Treated Soils and Aggregates	Soils
Calif. Test 217	Sand Equivalent	Soils
Calif. Test 219	Consolidation of Soils	Soils
Calif. Test 220	Permeability of Soils	Soils
Calif. Test 221	Unconfined Compression of Soils	Soils
Calif. Test 227	Method of Test for Evaluating Cleanness of Coarse Aggregate	Aggregates
Calif. Test 231	Relative Compaction of Untreated/Treated Soils and Aggregates (Area Concept Utilizing Nuclear Gauges)	Soils / Aggregates
Calif. Test 301	Resistance "R" Value of Treated and Untreated Bases, Subbases and Basement Soils (Stabilometer)	Soils / Bases
City of L.A.	Moisture Density Relations of Standard Plan Soils S-610	Aggregate Soils
ASTM C117	Standard Test Method for Materials Fined than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing	Aggregates
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregates	Aggregates
ASTM C128	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregates	Aggregates
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Aggregates



**SOILS LABORATORY (Compaction, Classification and Foundation) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C702	Standard Practice for Reducing Field Samples of Aggregate to Testing Size	Aggregates
ASTM D75	Standard Practice for Sampling Aggregates	Aggregates
ASTM D421	Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants	Aggregates
ASTM D422	Standard Test Method for Particle-Size Analysis of Soils	Soils
ASTM D558	Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures	Soil-Cement
ASTM D854	Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer	Soils
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method	Soils
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> ))	Soils
ASTM D1883	Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils	Soils
ASTM D2166	Standard Test Method for Unconfined Compressive Strength of Cohesive Soil	Soils
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	Soils
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate	Soils
ASTM D2434	Standard Test Method for Permeability of Granular Soils (Constant Head)	Soils
ASTM D2435	Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading	Soils



**SOILS LABORATORY (Compaction, Classification and Foundation) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	Soils
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)	Soils
ASTM D2844	Standard Test Method for Resistance <i>R</i> -Value and Expansion Pressure of Compacted Soils	Soils
ASTM D3080	Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions	Soils
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	Soils
ASTM D4718	Standard Practice for Correction of Unit Weight and Water Content for Soils containing Oversize Particles	Soils
ASTM D4829	Standard Test Method for Expansion Index of Soils	Soils
ASTM D5084	Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter	Soils
ASTM D6938	In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth)	Soils/Soil Aggregate

**SOILS LABORATORY (Drilling):**

<b>Test Method</b>		<b>Material</b>
ASTM D420	Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes	Soils/Rock
ASTM D653	Standard Terminology Relating to Soil, Rock, and Contained Fluids	Soil/Rock
ASTM D1452	Standard Practice for Soil Exploration and Sampling by Auger Borings	Soils

**SOILS LABORATORY (Drilling) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM D1586	Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils	Soils
ASTM D1587	Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes	Soils
ASTM D2937	Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method	Soils
ASTM D3550	Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils	Soils

**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, Recycling Agent):**

<b>Test Method</b>		<b>Material</b>
ASTM D5 AASHTO T49	Standard Test Method for Penetration of Bituminous Materials	Asphalt Cement Emulsion
ASTM D6	Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds	Asphalt Cement
ASTM D70* AASHTO T228*	Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)	Asphalt Cement Recycling Agent
ASTM D92* AASHTO T48*	Standard Test Method for Flash and Fire Point by Cleveland Open Cup Tester	Asphalt Cement Recycling Agent
ASTM D113 AASHTO T51	Standard Test Method for Ductility of Bituminous Materials	Asphalt Cement Emulsion

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.



**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, Recycling Agents) Continued:**

Test Method		Material
ASTM D2042 AASHTO T44	Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene	Asphalt Cement Emulsion
ASTM D2171* AASHTO 202*	Standard Test Method for Viscosity of Asphalt by Capillary Viscometer	Asphalt Cement
ASTM D93	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester	Asphalt Cement Recycling Agent
ASTM D1298	Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method	Asphalt Cement
ASTM D2170 AASHTOT201	Standard Test Method for Kinematic Viscosity of Asphalts (Bitumens)	Asphalt Cement Recycling Agent
AASHTO M320	Standard Specification for Performance Graded Asphalt	Asphalt Cement
ASTM D2872* AASHTO T240* Calif. Test 346	Standard Test Method for Effect of Heat and Air on Moving Film of Asphalt (Rolling Thin-Film Oven Test)	Asphalt Cement Recycling Agent
ASTM D6521* AASHTO R28*	Standard Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)	Asphalt Cement
ASTM D4402* AASHTO T316*	Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer	Asphalt Cement
ASTM D7175* AASHTO T315* Calif. Test 381	Standard Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)	Asphalt Cement

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.



**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, Recycling Agents) Continued:**

Test Method		Material
ASTM D6648* AASHTO T313*	Standard Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Reometer (BBR)	Asphalt Cement
ASTM D6925* AASHTO T312*	Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor	Asphalt Concrete
ASTM D5444* AASHTO T30*	Standard Test Method for Mechanical Analysis of Extracted Aggregate	Asphalt Concrete
ASTM D2726* AASHTO T166* Calif. Test 308	Standard Test Method for Determining Bulk Specific Gravity of Compacted Hot-Mix Asphalt Using Saturated Surface-Dry Specimens	Asphalt Concrete
ASTM D2041* AASHTO T209* Calif. Test 309	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Hot-Mix Asphalt paving Mixtures	Asphalt Concrete
ASTM D6926* AASHTO T245*	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, (Marshall Compaction)	Asphalt Concrete
ASTM D6927* AASHTO T245*	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, (Stability and Flow)	Asphalt Concrete
ASTM D3203* AASHTO T269*	Standard Test Method for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures	Asphalt Concrete
ASTM D6307* AASHTO T308* Calif. Test 382	Standard Test Method for Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method	Asphalt Concrete

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.

**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, Recycling Agents) Continued:**

Test Method		Material
AASHTO R47*	Reducing Samples of Hot-Mix Asphalt to Testing Size	Asphalt Concrete
ASTM D1188 AASHTO T275	Standard Test Method for Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Specimens	Asphalt Concrete
ASTM D2172 AASHTO T164 Calif. Test 310	Standard Test Method for Quantitative Extraction of Bituminous Paving Mixtures	Asphalt Concrete
ASTM D1856 AASHTO T170	Standard Test Method for Recovery of Asphalt From Solution by Abson Method	Asphalt Concrete
ASTM D6752 AASHTO T331	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method	Asphalt Concrete
ASHTO D1560 AASHTO T246	Standard Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus	Asphalt Concrete
ASTM D1561 AASHTO T247	Standard Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor	Asphalt Concrete
AASHTO M323	Standard Specification for Superpave Volumetric Mix Design	Asphalt Concrete
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods	Asphalt Concrete
ASTM C128 AASHTO T84	Standard Test Method for Specific Gravity and Absorption of Fine Aggregate	Aggregate

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.



**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, Recycling Agents) Continued:**

Test Method		Material
ASTM C127 AASHTO T85	Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate	Aggregate
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Aggregate
ASTM D3910	Standard Practices for Design and Construction of Slurry Seal	Slurry
ASTM D244 AASHTO T59 Calif. Test 330	Standard Test Methods and Practices for Emulsified Asphalts	Emulsified Asphalt
ASTM D88 AASHTO T72	Standard Test Method for Saybolt Viscosity	Emulsified Asphalt
AASHTO R18*	Establishing and Implementing a Quality System for Construction Materials Testing Laboratory	Quality Assurance
ASTM D4695	Standard Guide for General Pavement Deflection Measurements	Pavement Testing

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.

**SPECIAL TESTING AND RESEARCH LABORATORY:**

Test Method		Material
Calif. Test 342	Method of Test for Surface Skid Resistance with the California Portable Skid Testing	AC/PCC Pavement and Other Driving Surface
ASTM B136	Measurement of Stain Resistance of Anodic Coatings on Aluminum	Aluminum



**SPECIAL TESTING AND RESEARCH LABORATORY Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM B244	Measurement of Thickness of Anodic Aluminum Coatings on Aluminum and of Other Non-Conductive Coatings on Non-Magnetic Basis Metals with Eddy-Current Instrument	Aluminum
ASTM B137	Measurement of Mass of Coating on Anodically Coated Aluminum	Aluminum
ASTM C425	Compression Joints for Vitrified Clay Pipe and Fittings	Clay Pipe
ASTM D1400	Non-Destructive Measurement of Dry Film Thickness of Non-Conductive Coatings applied to a Nonferrous Metal Base	Coatings
ASTM D3359	Measuring Adhesion by Tape Test	Coatings
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens	Concrete
ASTM D1117	Testing Non-woven Fabrics	Fabrics
ASTM D3776	Mass per Unit Area (Weight) of Woven Fabric	Fabrics
ASTM D5034	Breaking Force and Elongation of Textile Fabric (Grab Test)	Fabrics
ASTM D4491	Water Permeability of Geotextiles by Permittivity	Geotextiles
ASTM D4632	Grab Breaking Load and Elongation of Geotextiles	Geotextiles
ASTM E605	Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members	Fire-Resistive Material
ASTM F606	Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets	Hardware
ASTM E8	Tension Testing of Metallic Materials	Metals
ASTM D570	Water Absorption of Plastics	Plastic
ASTM D638	Tensile Properties of Plastics	Plastic

**SPECIAL TESTING AND RESEARCH LABORATORY Continued:**

Test Method		Material
ASTM D695	Compressive Properties of Rigid Plastics	Plastic
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials	Plastic
ASTM D1242	Resistance of Plastic Materials to Abrasion	Plastic
ASTM D1621	Compressive Properties of Rigid Cellular Plastics	Plastic
ASTM D2122	Determining Dimensions of Thermoplastic Pipes and Fittings	Plastic Pipe
ASTM D2412	Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	Plastic Pipe
ASTM D2584	Ignition Loss of Cured Reinforced Resins	Resins
ASTM D395	Rubber Property-Compression Set	Rubber
ASTM D412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension	Rubber
ASTM D518	Rubber Deterioration-Surface Cracking	Rubber
ASTM D573	Rubber-Deterioration in an Air Oven	Rubber
ASTM D624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer	Rubber
ASTM D1149	Rubber Deterioration-Surface Ozone Cracking in a Chamber	Rubber
ASTM D2240	Rubber Property-Durometer Hardness	Rubber
ASTM D3183	Reparation of Pieces for Test Purposes from Products	Rubber
ASTM C121	Water Absorption of Slate	Slate
ASTM A370	Mechanical Testing of Steel Products	Steel
AWD D1.1	Structural Welding Code – Steel U.T., M.T., P.T. and Macroetching	Steel



**SPECIAL TESTING AND RESEARCH LABORATORY Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C97	Absorption and Bulk Specific Gravity of Dimensions Stone	Stone
ASTM C99	Modulus of Rupture of Dimension Stone	Stone
ASTM C170	Compressive Strength of Dimension Stone	Stone
ASTM C880	Flexural Strength of Dimensional Stone	Stone
ASTM D1238	Flow Rates of Thermoplastics by Extrusion Plastometer	Thermo- plastic
ASTM D2444	Impact Resistance of Thermoplastic Pipe Fittings by Means of a Tup	Thermo- plastic
ASTM A90	Weight of Coating on Zinc-Coated Iron or Steel Articles	Zinc
ASTM B695	Coating of Zinc Mechanically Deposited on Iron or Steel	Zinc



## APPENDIX F

### *FREQUENCY OF SAMPLING OF CONSTRUCTION MATERIALS*

## Frequency of Sampling of Construction Materials

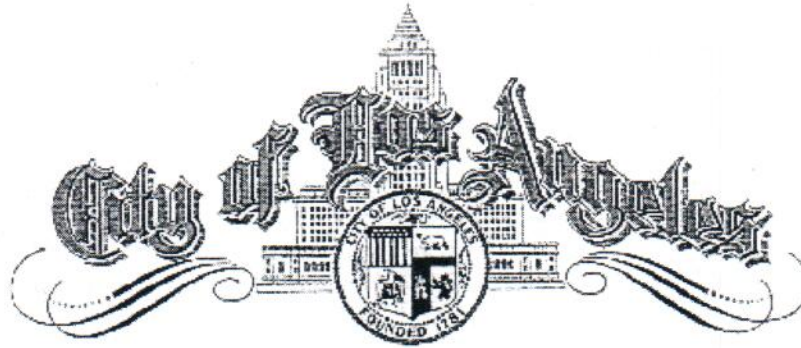
ASPHALT MATERIALS			
Work Description	QAP	Green Book 2012 Edition	Brown Book Latest Edition
Asphalt Binder (Original/RTFO/PAV)	1 sample per job at the plant for each 1000 tons of AC placed	x	1 sample per each lot or sub lot ( 1200 ton) per 302-5.9.2
Asphalt Emulsions	1 sample per job at the plant for each 1000 tons of AC placed	x	x
AC Mix Evaluations	1 sample per 1000 tons of AC	x	6 samples every 1200 tons per class, per source, per day per 302.5.1
Additives	Not Specified	x	Shall comply 302-5.9.2 and submit a sample upon delivery
Evaluation of Pavement Compaction by Nuclear Test Method	1 test every 1000 tons of AC	x	Min. 20 Nuclear test per project or unit per 302-5.9.3.1
Evaluation of Pavement Compaction by Coring	1 core per every 500 ft.	x	Min. four cores per project or unit per 302-5.9.3.1
Asphalt Aggregates Plants 1 & 2	One sample for every 500 to 1000 tons	x	x
Slurry Seal	1 sample per project	2 samples min. per slurry mixer per separate loads per day per 302-4.9.1	As specified in Green Book.
PORTLAND CONCRETE CEMENT			
Work Description	QAP	Green Book 2012 Edition	Brown Book Latest Edition
Consistency Test	Appendix D, Page 23, at least one sample per job.	x	x
Compressive Strength	Appendix D, page 24, "Fabricate at least two concrete cylinders per project "	Sec. 201-1.1.5 "The Engineer will determine the frequency of sampling"	As specified in Green Book.
SOILS			
Work Description	QAP	Green Book 2012 Edition	Brown Book Latest Edition
Soil Compaction Test	Appendix D, page 25 "One random location for every 2,500 sq. ft."	x	x

Note X- As required by the Inspector, Superintendent or Project Engineer



## APPENDIX G

### *CERTIFICATE OF PROFICIENCY*



*DEPARTMENT OF GENERAL SERVICES  
STANDARDS DIVISION*

**CERTIFICATE OF PROFICIENCY  
CONSTRUCTION MATERIALS TESTING**

*THIS CERTIFIES THAT STEVEN MORONES  
IS QUALIFIED TO PERFORM THE FOLLOWING ASTM  
TEST PROCEDURES:*

- C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
- C143: Standard Test Method for Slump of Hydraulic-Cement Concrete
- C172: Standard Practice for Sampling Freshly Mixed Concrete



  
CALIFORNIA REGISTERED ENGINEER

056139      11/01/13  
REGISTRATION NUMBER      DATE

EXPIRES THREE YEARS FROM ABOVE DATE



From: **Samaniego, Eric E@DOT** <[eric.samaniego@dot.ca.gov](mailto:eric.samaniego@dot.ca.gov)>  
Date: Tue, Jul 1, 2014 at 8:38 AM  
Subject: FW: FW: City of Los Angeles 2014 QAP  
To: "[ray.solomon@lacity.org](mailto:ray.solomon@lacity.org)" <[ray.solomon@lacity.org](mailto:ray.solomon@lacity.org)>  
Cc: "Kumar, Vin@DOT" <[vin.kumar@dot.ca.gov](mailto:vin.kumar@dot.ca.gov)>, "Wang, David@DOT" <[david.w.wang@dot.ca.gov](mailto:david.w.wang@dot.ca.gov)>, "Yenjai, Seree@DOT" <[seree.yenjai@dot.ca.gov](mailto:seree.yenjai@dot.ca.gov)>

Ray:

As stated on June 27, 2014 email. The City of Los Angeles QAP Revision 4

Is satisfactory and in compliance with the requirements of the QAP Manuel.

You can proceed to implement it as required by the City of Los Angeles

Departments.

CITY OF LOS ANGELES  
DEPARTMENT OF GENERAL SERVICES

STANDARDS DIVISION

2319 DORRIS PLACE  
LOS ANGELES, CA 90031  
(213) 485-2242  
FAX (213) 485-5075

Seree Yenjai  
Independent Assurance & RSP Branch  
ME Testing/Engineering Services Div  
CALTRANS  
5900 Folsom Blvd  
Sacramento, Ca  
95819-4612

March 16, 2015

Dear Mr. Yenjai

This letter is in response to your letter dated 1/7/15 in regards to the Quality Assurance Program (QAP) for the City of Los Angeles Rev 4, July 2014.

Our responses are as follows, as itemized in your letter:

- Item 1 ***“Document was reviewed, document is NOT IN COMPLIANCE to our requirement – revision is required.”***

The revision is embodied in the ADDENDUM to the QAP.

- Item 2 ***“Requirement: QAP must be signed by a licensed engineer in charge, with RCE# and Expiration date.”***

Duly noted and can be found in the Addendum to the QAP.

- Item 3 ***“Requirement: Provide address and contact information.”***

Duly noted and included in the Addendum to the QAP.

- Item 4.1 ***“Section 1: Provide qualification of the City’s IAP program in conformance section 5.0 of Caltrans latest QAP Manual (QAPM) for Use by Local Agencies: Rev. Jan 20, 2011.”***

Documentation attesting to the qualification of the IA program is available for inspection on-site.

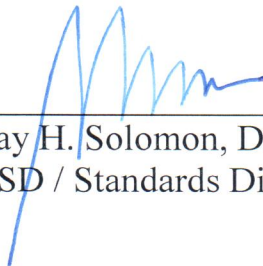
- Items 4.2 & 4.3 ***“Section 2: AASHTO is not allowed unless specified in Caltrans specification. ASTM is not allowed.”***

The QAP was not intended to apply to Section 2 and is duly noted as such in the Addendum to the QAP.

- Item 4.4 ***“Section 3: Provide field personnel certification for the following procedures: CTM, AASHTO & ASTM.”***  
A copy of all field personnel Certificates is available for review on-site.
- Item 4.5 ***“Section 3.1.2, sub-section A: Provide laboratory certification for following procedures: CTM, AASHTO & ASTM.”***  
A copy of Laboratory certifications is available for review on-site.
- Item 4.6 ***“Section 3.1.2, sub-section D: Provide acceptance tester Certification for following procedures: CTM, AASHTO & ASTM.”***  
A copy of all Acceptance Testers’ Certificates is available for review on-site.
- Item 4.7 ***“Section 3.2: Provide conformance to section 5.0 of QAPM. If there is a manual or record, please provide to this office for review. on site review may be require to check the qualification of IA personnel.”***  
Documentation attesting to the conformance to Section 5.0 will be provided on-site.
- Item 5 ***“Provide written responses to Action items herein.”***  
Written responses are provided in this letter.
- Item 6 ***“Please provide an electronic copy of a revised QAP to this office for 2<sup>nd</sup> review.”***  
Current QAP plus the Addendum will be provided in electronic form during the meeting.

We trust that this response will address your concerns.

Yours truly,



---

Ray H. Solomon, Director  
GSD / Standards Division



CITY OF LOS ANGELES  
DEPARTMENT OF GENERAL SERVICES  
STANDARDS DIVISION  
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**ADDENDUM**

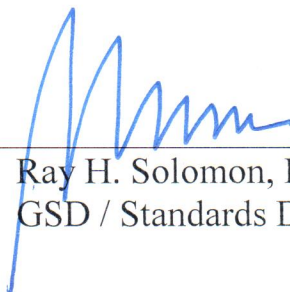
**To the City of Los Angeles  
Quality Assurance Program (QAP)  
Revision 4 July 2014**

Table of Contents

- 1. ADDENDUM 1.1  
ADDENDUM 1.2
- 2. ADDENDUM 2.0
- 3. ADDENDUM 3.0

DATED: 03-13-15

Signature:



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Ray H. Solomon, Director  
GSD / Standards Division

**CITY OF LOS ANGELES**  
**DEPARTMENT OF GENERAL SERVICES**  
**STANDARDS DIVISION**  
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**ADDENDUM 1.1**

Replace original signatories page with the following:

# QUALITY ASSURANCE PROGRAM

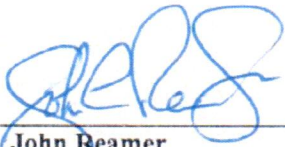
## QAP

### CITY OF LOS ANGELES

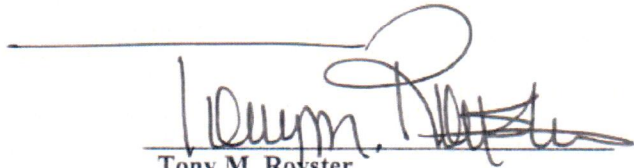
REVISION 4

JULY 2014

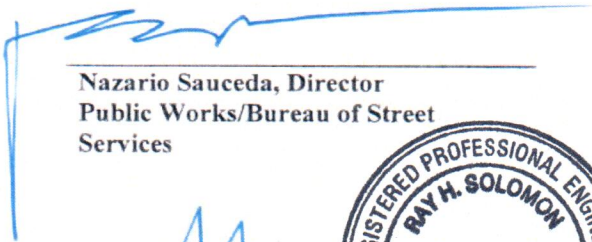
Approved by:



John Reamer  
Inspector of Public Works  
Public Works/Bureau of Contract  
Administration



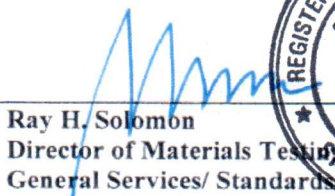
Tony M. Royster  
General Manager  
Department of General Services



Nazario Saucedo, Director  
Public Works/Bureau of Street  
Services



Deborah Weintraub,  
Interim City Engineer  
Public Works/Bureau of Engineering



Ray H. Solomon  
Director of Materials Testing  
General Services/ Standards



Revised By:  
Independent Assurance Unit  
General Services/Standards Division



**CITY OF LOS ANGELES**  
**DEPARTMENT OF GENERAL SERVICES**  
**STANDARDS DIVISION**  
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FAX (213) 485-5075

**ADDENDUM 1.2**

Add the following after the new signatories page:

**RAY H. SOLOMON, P.E.  
DIRECTOR  
STANDARDS DIVISION  
DEPARTMENT OF GENERAL SERVICES  
CITY of LOS ANGELES  
2319 Dorris Place  
Los Angeles, Ca 90031**

**Direct Phone: (213) 847-0928**

**Office: (213) 485-2242**

**Fax: (213) 485-5075**

**E-Mail: [Ray.Solomon@lacity.org](mailto:Ray.Solomon@lacity.org)**

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**STANDARDS DIVISION**  
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ADDENDUM 2.0

Replace Section 2. with the following:

**2. QUALITY ASSURANCE PROGRAM FOR NHS PROJECTS ON THE SHS**

This QAP does not apply to Section 2.



CITY OF LOS ANGELES  
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ADDENDUM 3.0

Replace Appendix E – Extent of Testing

with the following:



# APPENDIX E

*EXTENT OF TESTING*

*(As of 03-13-2015)*

**PHYSICAL LABORATORY (Concrete, Masonry and Steel):**

<b>Test Method</b>		<b>Material</b>
Calif. Test 670	Method of Tests for Mechanical and Welded Reinforcing Splices	Steel Splices
ASTM A82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement	Steel Wire
ASTM A185	Standard Specification for Steel Welded Wire, Fabric	Steel Wire
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	Steel Products
ASTM A416	Standard Specification for Steel Strand, Uncoated Seven-Wire for Pre-stressed Concrete	Steel Wire
ASTM A496	Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement	Steel Wire
ASTM A615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	Steel Wire
ASTM A617*	Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement *	Steel Bars
ASTM A706*	Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement *	Steel Bars
ASTM A722	Standard Specification for Uncoated High-Strength Steel Bar for Pre-stressing Concrete	Steel Bars
ASTM C31	Making and Curing Concrete Specimens in the Field	Concrete
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens	Concrete
ASTM C40	Organic Impurities in Fine Aggregate	Aggregate
ASTM C42	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	Concrete

\*Physical Laboratory participates in the Cement and Concrete Reference Laboratory (CCRL) Proficiency Samples Program.



**PHYSICAL LABORATORY (Concrete, Masonry and Steel) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C88	Standard Test Method for Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate	Aggregate
ASTM C90	Standard Specification for Hollow Load Bearing Concrete Masonry Units	Concrete Masonry Block
ASTM C109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch cube specimens)	Cement
ASTM C117	Materials Finer than 75 mm (No. 200) Sieve in Mineral Aggregates by Washing	Aggregate
ASTM C127	Specific Gravity and Absorption of Coarse Aggregate	Aggregate
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	Aggregate
ASTM C136	Sieve Analysis of Fine and Coarse Aggregate	Aggregate
ASTM C140	Method of Sampling and Testing Concrete Masonry Units	Masonry
ASTM C143	Slump of Hydraulic Cement Concrete	Concrete
ASTM C172	Sampling Freshly Mixed Concrete	Concrete
ASTM C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory	Concrete
ASTM C289	Method for Potential Reactivity of Aggregate (Chemical Method)	Aggregate
ASTM C301	Standard Methods of Testing Vitrified Clay Pipe	Sewer Pipe
ASTM C495	Standard Test Method for Compressive Strength of Lightweight Insulating Concrete	Concrete
ASTM C497	Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile	Concrete Pipe
ASTM C617	Capping Cylindrical Concrete Specimens	Concrete

**PHYSICAL LABORATORY (Concrete, Masonry and Steel) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C702	Standard Practice for Reducing Field Samples of Aggregate to Testing Size	Aggregate
ASTM C1019	Standard Test Method for Sampling and Testing Grout	Grout
ASTM C1107	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)	Grout
ASTM C1314	Standard Test Method for Compressive Strength of Masonry Prisms	Masonry
ASTM D75	Standard Practice for Sampling Aggregates	Aggregate
ASTM D4791	Standard Test Method for Flat or Elongated Particles in Coarse Aggregate	Aggregate
ACI 318 - 12.14.3	Building Code Requirements for Structural Concrete – Mechanical and Welded Splices	Steel Splices
UBC Std. No. 24-26	Test Method for Compressive Strength of Masonry Prisms	Masonry

**SOILS LABORATORY (Compaction, Classification and Foundation):**

<b>Test Method</b>		<b>Material</b>
City of L.A. Standard Plan S-610	Moisture Density Relations of Soils	Aggregate Soils
ASTM C117	Standard Test Method for Materials Fined than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing	Aggregates
ASTM C127 AASHTO T85	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregates	Aggregates
ASTM C128 AASHTO T84	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregates	Aggregates

**SOILS LABORATORY (Compaction, Classification and Foundation) Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Aggregates
ASTM C702	Standard Practice for Reducing Field Samples of Aggregate to Testing Size	Aggregates
ASTM D75	Standard Practice for Sampling Aggregates	Aggregates
ASTM D422	Standard Test Method for Particle-Size Analysis of Soils	Soils
ASTM D558	Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures	Soil-Cement
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method	Soils
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2,700 kN-m/m <sup>3</sup> ))	Soils
ASTM D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	Soils
ASTM D2419 AASHTO T176	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate	Soils
ASTM D2435	Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading	Soils
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	Soils
ASTM D3080	Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions	Soils
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	Soils



**SOILS LABORATORY (Compaction, Classification and Foundation) Continued:**

ASTM D4718	Standard Practice for Correction of Unit Weight and Water Content for Soils containing Oversize Particles	Soils
ASTM D4829	Standard Test Method for Expansion Index of Soils	Soils
ASTM D6938	In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth)	Soils/Soil Aggregate

**SOILS LABORATORY (Drilling):**

<b>Test Method</b>		<b>Material</b>
ASTM D420	Standard Guide to Site Characterization for Engineering, Design, and Construction Purposes	Soils/Rock
ASTM D653	Standard Terminology Relating to Soil, Rock, and Contained Fluids	Soil/Rock
ASTM D1452	Standard Practice for Soil Exploration and Sampling by Auger Borings	Soils
ASTM D1586	Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils	Soils
ASTM D1587	Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes	Soils
ASTM D2937	Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method	Soils
ASTM D3550	Standard Practice for Thick Wall, Ring-Lined, Split Barrel, Drive Sampling of Soils	Soils

**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, and Recycling Agent):**

<b>Test Method</b>		<b>Material</b>
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates	Aggregate

**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, and Recycling Agent) Continued:**

ASTM D5 AASHTO T49	Standard Test Method for Penetration of Bituminous Materials	Asphalt Cement Emulsion
ASTM D70* AASHTO T228*	Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)	Asphalt Cement Recycling Agent
ASTM D88 AASHTO T72	Standard Test Method for Saybolt Viscosity	Emulsified Asphalt
ASTM D92* AASHTO T48*	Standard Test Method for Flash and Fire Point by Cleveland Open Cup Tester	Asphalt Cement Recycling Agent
ASTM D113 AASHTO T51	Standard Test Method for Ductility of Bituminous Materials	Asphalt Cement Emulsion
ASTM D244 AASHTO T59	Standard Test Methods and Practices for Emulsified Asphalts	Emulsified Asphalt
ASTM D1188 AASHTO T275	Standard Test Method for Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Specimens	Asphalt Concrete
ASTM D2041* AASHTO T209*	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Hot-Mix Asphalt paving Mixtures	Asphalt Concrete
ASTM D2170 AASHTO T201	Standard Test Method for Kinematic Viscosity of Asphalt (Bitumen)	Asphalt Cement Recycling Agent
ASTM D2171* AASHTO T202*	Standard Test Method for Viscosity of Asphalt by Capillary Viscometer	Asphalt Cement
ASTM D2726* AASHTO T166*	Standard Test Method for Determining Bulk Specific Gravity of Compacted Hot-Mix Asphalt Using Saturated Surface-Dry Specimens	Asphalt Concrete

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method

**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, and Recycling Agent) Continued:**

ASTM D2872* AASHTO T240*	Standard Test Method for Effect of Heat and Air on Moving Film of Asphalt (Rolling Thin-Film Oven Test)	Asphalt Cement Recycling Agent
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods	Asphalt Concrete
ASTM D3203* AASHTO T269*	Standard Test Method for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures	Asphalt Concrete
ASTM D3910	Standard Practices for Design and Construction of Slurry Seal	Slurry
ASTM D4402* AASHTO T316*	Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer	Asphalt Cement
ASTM D4694 ASTM D4695	Standard Guide for General Pavement Deflection Measurements	Pavement Testing
ASTM D5444* AASHTO T30*	Standard Test Method for Mechanical Analysis of Extracted Aggregate	Asphalt Concrete
ASTM D6307* AASHTO T308*	Standard Test Method for Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method	Asphalt Concrete
ASTM D6521* AASHTO R28*	Standard Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)	Asphalt Cement
ASTM D6648* AASHTO T313*	Standard Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)	Asphalt Cement
ASTM D6752 AASHTO T331	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method	Asphalt Concrete

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method



**ASPHALT LABORATORY (Asphalt Cement and Concrete, Emulsified Asphalt, Slurry, and Recycling Agent) Continued:**

ASTM D6925* AASHTO T312*	Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor	Asphalt Concrete
ASTM D6926* AASHTO T245*	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, (Marshall Compaction)	Asphalt Concrete
ASTM D6927* AASHTO T245*	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, (Stability and Flow)	Asphalt Concrete
ASTM D7175* AASHTO T315*	Standard Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)	Asphalt Cement
AASHTO M320	Standard Specification for Performance Graded Asphalt	Asphalt Cement
AASHTO M323	Standard Specification for Superpave Volumetric Mix Design	Asphalt Concrete
AASHTO R18*	Establishing and Implementing a Quality System for Construction Materials Testing Laboratory	Quality Assurance
AASHTO R47*	Reducing Samples of Hot-Mix Asphalt to Testing Size	Asphalt Concrete

\* AASHTO Materials Reference Laboratory (AMRL) certified Asphalt Laboratory to perform this Test Method.

**SPECIAL TESTING AND RESEARCH LABORATORY:**

<b>Test Method</b>		<b>Material</b>
Calif. Test 342	Method of Test for Surface Skid Resistance with the California Portable Skid Testing	AC/PCC Pavement and Other Driving Surface
ASTM A36	Tensile Testing of Carbon Structural Steel	Steel

**SPECIAL TESTING AND RESEARCH LABORATORY Continued:**

<b>Test Method</b>		<b>Material</b>
ASTM A82	Mechanical Testing of Cold-Drawn Steel Wire for Concrete Reinforcement	Steel
ASTM A90	Weight of Coating on Zinc-Coated Iron or Steel Articles	Zinc
ASTM A307	Mechanical Testing of Carbon Steel Bolts and Studs	Steel
ASTM A325	Mechanical Testing of High Strength, Heavy Hex Structural Steel Bolts	Steel
ASTM A370	Mechanical Testing of Steel Products	Steel
ASTM A500	Testing of Cold-Formed, Carbon Steel Structural Tubing	Steel
ASTM A572	Testing of High Strength Low-Alloy Structural Steel	Steel
ASTM A648	Mechanical Testing of High Strength Steel Wire for Prestressed Concrete Pipe	Steel
ASTM A992	Tensile Testing of Rolled Steel Structural Shapes	Steel
ASTM B136	Measurement of Stain Resistance of Anodic Coatings on Aluminum	Aluminum
ASTM B137	Measurement of Mass of Coating on Anodically Coated Aluminum	Aluminum
ASTM B244	Measurement of Thickness of Anodic Aluminum Coatings on Aluminum and of Other Non-Conductive Coatings on Non-Magnetic Basis Metals with Eddy-Current Instrument	Aluminum
ASTM C1028	Standard Test Method For Determining The Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces By The Horizontal Dynamometer Pull-Meter Method	Ceramic Tile
ASTM D395	Rubber Property-Compression Set	Rubber
ASTM D412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension	Rubber

**SPECIAL TESTING AND RESEARCH LABORATORY Continued:**

ASTM D570	Water Absorption of Plastics	Plastic
ASTM D638	Tensile Properties of Plastics	Plastic
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials	Plastic
ASTM D1238	Flow Rates of Thermoplastics by Extrusion Plastometer	Thermoplastic
ASTM D1400	Non-Destructive Measurement of Dry Film Thickness of Non-Conductive Coatings applied to a Nonferrous Metal Base	Coatings
ASTM D2240	Rubber Property-Durometer Hardness	Rubber
ASTM D2412	Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	Plastic Pipe
ASTM D2444	Impact Resistance of Thermoplastic Pipe Fittings by Means of a Tup	Thermoplastic
ASTM D2584	Ignition Loss of Cured Reinforced Resins	Resins
ASTM D3359	Measuring Adhesion by Tape Test	Coatings
ASTM E8	Tension Testing of Metallic Materials	Metals
ASTM E605	Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members	Fire-Resistive Material
ASTM F606	Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets	Hardware
ASTM G62	Standard Test Method for Holiday Detection in Pipeline Coatings	Pipeline Coating
AWS D1.1	Structural Welding Code – Steel U.T.	Steel