

CITY OF STOCKTON

Quality Assurance Program

1. Purpose

The purpose of the City of Stockton Quality Assurance Program (QAP) is to provide an outline of procedures to assist in achieving quality performance for:

- planning;
- preparing contracts, plans, and specifications; and
- assuring that acceptance and inspection sampling and testing meets City, State and Federal requirements.

The main elements addressed in this QAP are procedures for:

Acceptance Testing;
Testing of Manufactured Materials; and
Independent Assurance Requirements

This QAP has been adopted by the City of Stockton as a guide for quality assurance for planning, design, and construction of public streets and state highway improvements within the City of Stockton. This QAP has been written to conform with current Caltrans and FHWA requirements. It is not intended to be a substitute for professional engineering knowledge, training, experience or judgment.

2. Definition of Terms

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

3. Applicability

This QAP shall only apply to projects within the City of Stockton that are off the National Highway System (Off-NHS) and off the State Highway System (Off-SHS) and are financed wholly or in part by federal-aid funding. For such projects the use of this QAP shall be mandatory. The provisions of this QAP may also be applied to street and utility facility

projects within the City of Stockton that are Off-NHS and Off-SHS and are locally funded. For projects on the NHS, quality assurance requirements are detailed in the Code of Federal Regulations Title 23, Part 637.205. Therefore, federally funded projects wholly or in part on the National Highway System (On-NHS) must comply with the Caltrans QAP as detailed in Section 16.14 of the Caltrans Local Assistance Procedures Manual (LAPM).

4. Authority

This QAP was prepared under the supervision of, and has been approved by, the City of Stockton Director of Public Works or his designee (City Engineer), who is an appropriately registered civil engineer. Copies of this QAP shall be kept on file in the office of the City Engineer and shall be available for review upon request.

5. Amendments

Amendments to this QAP will require approval by the City of Stockton Director of Public Works or his designee, the City Engineer. Amendments may be approved in either of the following forms:

By general amendment applicable to all applicable projects as described above; and

By specific amendment included within the contract documents applicable to a specific project. In the event of a conflict between this QAP and the contract documents for a specific project, the contract documents shall prevail.

In the event of amendment(s), the applicable QAP shall be the latest edition in effect at the time the subject materials are actually incorporated into the project documents. The Director of Public Works or the City Engineer may also issue clarifications to this QAP as required.

6. Materials Testing

Sampling and testing will be performed by contract with a material testing consultant. The contract with the materials testing consultant shall be arranged prior to advertising a project and addressed appropriately in the construction documents. The construction contractor shall not select or exercise any authority over the materials testing consultant or any of the sampling and testing unless specifically included in the contract documents for a specific project or otherwise approved by the City of Stockton Director of Public Works or the City Engineer in writing prior to the start of the actual sampling and testing work.

The materials testing consultant shall have a QAP that meets current Caltrans and FHWA requirements and shall provide a copy to the City upon request. Consultant(s) shall also forward copies of all subsequent amendments of their QAP(s) to the City.

The consultant's materials laboratory shall be under the responsible management of a California Registered Engineer with experience in sampling, inspection and testing of construction materials. The Engineer shall certify the results of all tests performed by laboratory personnel under the Engineer's supervision. The materials laboratory shall contain certified test equipment capable of performing the tests conforming to the

provisions of this QAP

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

Correlation Testing Program - The materials laboratory shall be a participant in one or more of the following testing programs:

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

Certification of Personnel - The materials laboratory shall employ personnel who are certified by one or more of the following: Caltrans District Materials Engineer

- Nationally recognized non-Caltrans organizations such as the American Concrete Institute, Asphalt, National Institute of Certification of Engineering Technologies, etc.

- Other recognized organizations approved by the State of California and/or recognized by local governments or private associations.

Certificates for personnel on a project shall be retained in the Resident Engineer's (RE) project file(s) and shall be made available for review upon request. Sampling and testing by uncertified person(s) not previously approved by the Director of Public Works or the City Engineer, shall be acceptable only in extreme, unforeseen emergencies, and upon assurance by the Resident Engineer that the uncertified person is competent to perform the work.

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

Records - Copies of the City's QAP, the materials testing consultant's QAP, records of samples and tests, material releases, and certificates of compliance for a project shall be incorporated into the RE's project file, and shall be available for review upon request, and shall be retained for a period of three years following completion of the project. The RE shall complete and sign a Materials Certificate (Caltrans LAPM Exhibit 17-G). The Certificate shall be retained in the project construction files. All non-conforming materials incorporated into the work must be explained and justified on the Certificate.

7. Acceptance Sampling and Testing

Definition -- Acceptance Testing (AT) shall be defined as regular sampling and testing of materials entering a construction project to verify compliance with the specific project contract documents, City of Stockton Standard Plans and Specifications, and/or Caltrans

regulations.

Start of Testing -- Sampling and testing should begin as soon as materials are placed on a project. Testing should be performed promptly to enable data evaluation and necessary measures to be taken by the RE and contractor.

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

Test Methods -- Except as otherwise specified and/or approved by the City, testing methods shall comply with California test methods (using English equivalent units). American Society of Testing and Materials (ASTM) test methods may also be acceptable, subject to City approval.

Tests to be Performed -- The following sampling and testing shall comprise the minimum scope of AT to be routinely completed for commonly used materials unless otherwise modified by the contract documents for a specific project, unless determined to be minor quantities by the RE, or as otherwise approved in writing by the Director of Public Works or the City Engineer.

Aggregate Base (AB) - Sieve Analysis, Sand Equivalent, R-Value and Maximum Density (Relative Compaction) for each new source and In-Place Density for AB sampled at the site.

Aggregate Sub-base (ASB) - Sieve Analysis, Sand equivalent, R-Value and Maximum Density for each new source and In-Place Density for AB sampled at the site.

Asphalt Concrete (AC)- Sieve Analysis for aggregate sampled at the plant. Asphalt Content and Maximum Density for each new source and mix design and In-Place Density for AC sampled at the site. (A Certificate of Compliance may be accepted for Liquid Asphalt.)

Grading and Trench Backfill- Maximum Density and In-Place Density at the site. Structural Concrete - Sieve analysis for aggregate sampled at the plant. (A Certificate of compliance may be accepted for Aggregate Cleanliness, Aggregate Sand Equivalent, Admixtures, and Portland Cement Concrete.) Compressive Strength (Cylinders) at the site.

Where additional sampling and testing not described above is required, it shall be in accordance with Caltrans Frequency Tables (LAPM Exhibit 16-R), and the Caltrans Standard Specifications, unless otherwise modified by the contract documents for a specific project or otherwise approved in writing by the Director of Public Works or the City Engineer.

Frequency -- Sample locations and frequencies may be in accordance with the contract

specifications. If not so specified in the contract specifications, samples shall be taken at the locations and frequencies as shown in Appendix D, "Acceptance Sampling and Testing Frequencies" of the Caltrans QAP Manual (included as Attachment 1 to this QAP). The tables are intended as a guide; the actual quality of materials tested may justify decreasing or increasing the frequency of subsequent similar samples and tests.

In-Place density testing for trench backfill shall generally be completed at intervals not exceeding 500 linear feet of trench.

Test Result Reporting Guidelines -- Results should generally be submitted to the RE within three working days of sampling, or as dictated by the construction schedule, except as listed below:

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

When sampling products such as Portland Cement Concrete (PCC), cement-treated base (CTB), hot mix asphalt (HMA), and other such materials; the time of such sampling shall be varied with respect to the time of the day insofar as possible, in order to avoid a predictable sampling routine. Results may be expedited by using fax, telephone, or e-mail.

Summary Logs -- Material Testing Summary Logs shall be maintained by the RE for each material requiring multiple sampling and testing. Log data shall include station location, test sample depth, approximate quantity of sample material, test result, and tester identification.

Minor Materials/Quantities -- Relatively minor quantities of materials from a known, reliable source may be accepted without testing if the RE performs visual examination of the materials; or the manufacturer or supplier certifies that the material furnished complies with specification requirements.

Such records of acceptance shall be placed in the RE's project files with related inspection notes. The following quantities are approximate amounts of maximum allowable minor materials/quantities:

Aggregates and Sub-Aggregates (other than Portland Cement Concrete) - 100 tons per day or 500 tons per project.

Bituminous Mixtures - 50 tons per day.

Bituminous Materials - 100 gallons per project.

Trench Compaction - 100 linear feet of trench.

Re-Testing -- Failing test results requires re-testing to isolate the failed area. The Log Summary shall cross-reference the retest to the initial failed test. Cost for repeated tests may be charged to the construction contractor if this has been included in the specifications.

Testing of Manufactured Materials -- During the Design phase of the project, the Project Engineer may submit a "Source Inspection Request" (Exhibit 16-V of the LAPM) to the Agency, consultant, or Caltrans for inspection and testing of manufactured and prefabricated materials by their materials laboratory. A list of materials that can be typically accepted on the basis of certificates of compliance during construction is found in Appendix F of the Caltrans QAP Manual (included as Attachment 2 to this QAP). All certificates of compliance shall conform to the requirements of the contract specifications, for examples see Appendix J of the Caltrans QAP Manual.

If the City request Caltrans to conduct the source inspection, and the request is accepted, all sampling, testing, and acceptance of manufactured and prefabricated materials will be performed by Caltrans' Office of Materials Engineering and Testing Services. For Federal-aid projects on the National Highway System (NHS), Caltrans will assist in certifying the materials laboratory, and the acceptance samplers and testers. For Federal-aid projects off the NHS, Caltrans may be able to assist in certifying the materials laboratory, and the acceptance samplers and testers.

8. Independent Assurance Program (IAP)

Definition -- Independent Assurance Program (IAP) shall be defined as procedures to verify that Acceptance Testing is being performed correctly and reliably, and to ensure that equipment is properly calibrated, and personnel are adequately trained on proper testing procedures.

Applicability

IAP procedures shall be required for federally funded projects on and off the NHS system. For On-NHS projects, IAP procedures shall be in accordance with the Caltrans 'Quality Assurance Program Manual' and shall be completed by Caltrans' personnel. For Off-NHS projects, IAP procedures shall be as specified herein unless otherwise modified by the contract documents for a specific project or as otherwise approved in writing by the Director of Public Works or the City Engineer. IAP procedures may also be applied to other street, highway and utility facility projects, both public and private, within the City of Stockton.

IAP Testing Options -- IAP for City projects will generally be performed by contract consultant testers or by other agency personnel. IAP personnel shall be certified in all required testing procedures, as part of IAP, and shall not be involved in any aspect of AT. IAP shall be performed on every type of materials test required for the project. Proficiency tests shall be performed on Sieve Analysis, Sand Equivalent, and Cleanness Value tests. All other types of IAP shall be witness tests.

Poor correlation between acceptance tester's results and other test results may indicate probable deficiencies with the acceptance sampling and testing procedures. In cases of unresolved discrepancies, a complete review of AT shall be performed by IAP personnel, or an independent materials laboratory chosen by the Agency. IAP samples and tests are not to be used for determining compliance with contract requirements. Compliance with contract requirements is determined only by AT.

Type and Frequency of IAP -- The following shall comprise the minimum IAP scope to be routinely completed for AT of commonly used materials unless otherwise approved in writing by the Director of Public Works or the City Engineer.

Aggregate Bases and Sub-Bases - Sieve Analysis, Sand Equivalent, Maximum Density and In-Place Density. Witness test and split sample test at intervals not to exceed one year.

Asphalt Concrete - Sieve Analysis for aggregate sampled at the plant and In-Place Density. Witness test and split sample test at intervals not to exceed one year.

Grading and Trench Backfill - Maximum Density and In-Place Density. Witness test and split sample test at intervals not to exceed one year.

Concrete - Compressive Strength (Cylinders). Witness test and split sample test at intervals not to exceed one year.

The IAP frequency for commonly used materials not included above or for contract consultant testers shall be as specified in the consultant laboratory's QAP or as otherwise approved by the City.

Test Result Reporting Guidelines -- Results should generally be submitted to the RE within five working days of sampling, or as dictated by the construction schedule. Results may be expedited by using fax, telephone, or e-mail. IAP results shall be recorded on either the Report of Witness Test (Exhibit 16-F of the LAPM) or the Corroboration Report (Exhibit 16-G of the LAPM).

Summary Logs -- IAP Summary Logs (Exhibit 16-H of the LAPM) shall be maintained by the RE for each material requiring IAP. The summary logs shall be included in the project files.

9. Project Certification

Upon completion of a Federal-aid project, a "Materials Certificate" shall be completed by the Resident Engineer. The City shall include the "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 project files. The Resident Engineer in charge of the construction 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. See Appendix K of the Caltrans QAP Manual for an example.

10. Records

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

- The files shall be organized as described in Section 16.8 "Project Files" of the Caltrans Local Assistance Procedures Manual.
- The complete project file be available at a single location for inspection by Caltrans and Federal Highway Administration (FHWA) personnel.
- The project files shall be available for at least three years following the date of final project voucher.
- Sampling and Testing results shall be entered into a "Log Summary," as shown in Appendix H of the Caltrans QAP Manual.

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

APPROVED BY:  057830 6/30/20
(Signature) (CE# and Expiration Date)

TITLE: City Engineer DATE: 11/16/18

THIS QAP TO REMAIN IN EFFECT FOR 5 YEARS FROM DATE SHOWN ABOVE

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 F - Construction Materials Accepted by a Certificate of Compliance *

Soil Amendment
Fiber
Mulch
Stabilizing Emulsion
Plastic Pipe
Lime
Reinforcing Steel
Structural Timber and Lumber
Treated Timber and Lumber
Timber and Lumber
Culvert and Drainage Pipe Joints
Reinforced Concrete Pipe
Corrugated Steel Pipe and Corrugated Steel Pipe Arches
Structural Metal Plate Pipe Arches and Pipe Arches
Perforated Steel Pipe
Polyvinyl Chloride Pipe and Polyethylene Tubing
Steel Entrance Tapers, Pipe Down drains, Reducers, Coupling Bands and Slip Joints
Aluminum Pipe (Entrance Tapers, Arches, Pipe Down drains, Reducers, Coupling Bands and Slip Joints)
Metal Target Plates
Electrical Conductors
Portland Cement
Minor Concrete
Waterstop

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

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