



## Amador County Transportation Commission

### CONSTRUCTION ADMINISTRATION

#### Quality Assurance Program for NON-NHS Projects

July 7, 2008

#### **OVERVIEW**

A Quality Assurance Program (QAP) is a sampling and testing program that provides assurance that the materials and workmanship incorporated in each highway construction project are in conformance with the contract specifications. The main elements of a Quality Assurance Program are acceptance testing and independent assurance sampling and testing.

The requirements for the type of QAP depend on whether the project is on or off the NHS.

State and Federally funded projects require all local agencies to have a quality assurance program (QAP) in-place to assure that the materials installed are in compliance with the plans and specifications. This is also sound practice that should be followed regardless of the funding source.

Most specifically, local agencies must have a quality assurance program in conformance with Section 16.14 of the *Local Assistance Procedures Manual (LAPM)* and Caltrans will not process construction Requests for Authorization for projects not covered by a conforming QAP.

#### **PURPOSE**

This QAP is official policy of the Amador County Transportation Commission and will be followed by ACTC for construction projects it undertakes off the National Highway System. All of foreseeable projects of the Amador County Transportation Commission are "Non-National Highway System" projects

#### **POLICY**

Both the Caltrans Test Methods and the American Society for Testing and Materials (ASTM) test methods will be acceptable by this QAP. The method of conversion is shown in Attachment 1 "Caltrans Test Method - ASTM Test Method Conversion Chart," from the Local Assistance Procedures Manual. Any future changes to the LAPM are hereby incorporated by reference.

The plans and specifications will determine the method of acceptance for each individual project.

#### **DEFINITIONS**

Material Testing Agency – The qualified commercial firm, in the business to do such work, hired by the Amador County Transportation Commission to take samples in the field, perform the field and laboratory analysis by recognized industry standards, and report the results directly to the Project Inspector.

Project Inspector – The Amador County Transportation Commission representative assigned to the project for the purpose of inspection field work, and coordinating the sampling and testing of materials to verify compliance with the plans and specifications.

Resident Engineer – The Amador County Transportation Commission representative, licensed as a Civil Engineer in the State of California, which is responsible for the overall administration of the project to assure compliance to the plans and specifications.

## **QA/QC PROCEDURAL REQUIREMENTS**

### **I. MATERIAL TESTING AGENCY**

The Amador County Transportation Commission will contract out with a commercially licensed firm that regularly performs material testing as a business, to do the field sampling and laboratory testing. All work, performed by the firm, shall be performed under the responsible charge of a qualified licensed Civil Engineer in the State of California who is employed by the material-testing agency.

The material-testing agency shall maintain laboratory accreditation and have its testing machines calibrated annually by impartial means using devices of accuracy traceable to the National Bureau of Standards. The Laboratory shall participate in the AASHTO Materials Reference Laboratory (AMRL) and Cement and Concrete Reference Laboratory (CCRL) inspection programs as appropriate.

### **II. ACCEPTANCE TESTING**

The Project Inspector shall inspect materials that need to be inspected at the job site, to assure compliance with the plans and specifications. When the Project Inspector determines that field testing and sampling is necessary by the specifications and/or required by recognized industry standards, the project inspector shall coordinate that activity with the material-testing agency.

Test results, by the material testing agency, shall be reported directly to the Project Inspector. On failed test results, it is the Project Inspector's responsibility to obtain corrective work from the contractor to show compliance with the plans and specifications. Test results and daily activity reports shall be on file and maintained on the project records.

### **III. TESTING OF MANUFACTURED MATERIALS**

In general, the Amador County Transportation Commission will accept "certificates of compliance" from the manufacturer for products in which the industry has demonstrated a high degree of reliability in meeting specifications. The Resident Engineer or the Project Inspector will designate on the approved submittal sheet when sampling, inspection, and/or testing are needed at the source of the material.

When source inspection is necessary, the project inspector will arrange to have a qualified individual and/or a qualified material testing agency perform the work. Certificates of compliance are usually accepted for materials listed in Attachment 2 "Materials Typically Accepted by a Certificate of Compliance," from the LAPM. Any future changes to the LAPM are hereby incorporated by reference.

### **IV. INDEPENDENT ASSURANCE SAMPLING AND TESTING**

The purpose of independent assurance sampling and testing (IAST) is to assure that individuals performing each test are performing it correctly, and that the equipment used has been properly maintained and calibrated. As a result, the Amador County Transportation Commission will only use the services of a commercially licensed firm that meets the criteria stated above for a

material-testing agency. The material-testing agency will also have a QAP to verify that acceptance testing is being performed correctly.

V. PROJECT CERTIFICATION

Upon completion of a project the licensed Civil Engineer who is employed by the material-testing agency shall complete a "Materials Certificate." Said Engineer shall certify that:

- all testing procedures were performed in conformance with the applicable standards and/or methods for that test; and,
- the results of the tests on acceptance samples indicate that the materials incorporated in the construction work were in conformity with the approved plans and specifications.

VI. RECORD OF TEST RESULTS


The Project Inspector shall maintain a material and testing "Summary Log" for each material requiring multiple sampling and testing. The summary log shall include appropriate data such as station location, depth of test sample, approximate quantity of material represented by the test sample, test results, and tester name. Failed initial test results, which require re-testing of the material, will be cross-referenced to the passing test on the summary log.

V. FREQUENCY OF TESTING

The frequency of sampling and testing shall be conducted in accordance with the plans and specifications, and as required in the LAPM. Attachment 3 "Size, Frequency and Location of Sampling and Testing Tables" is the current LAPM requirement. Any future changes to the LAPM are hereby incorporated by reference.

Whenever failures occur, sufficient additional acceptance tests shall be taken to isolate the affected work. Documentation of the results of such additional tests shall be included in the records, including a description of the corrective measures taken.

Approval Recommended By:

  
\_\_\_\_\_  
Date: 7/9/08  
Matt Griggs, PE  
Agency Engineer

  
\_\_\_\_\_  
Date: 7/10/08  
Charles Field  
Executive Director

## 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 VIII (revised 1994). Refer to the Agency, special provisions, contract plans, and applicable standard specifications, for correct sampling and test methods (ASTM-CTM).

CTM	ASTM	Book of Standard	TEST PROCEDURE	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

## 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 VIII (revised 1994). 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 VIII (revised 1994). 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).*

**MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE  
PER CALTRANS STANDARD SPECIFICATIONS - 1995 Edition**

<b>Section Material</b>	<b>Page</b>	
20-2.03	Soil amendment	20-2
20-2.07	Fiber	20-2
20-2.08	Mulch	20-3
20-2.11	Stabilizing emulsion	20-4
20-2.15B(1)	Plastic pipe supply line (Limited circumstance)	20-6
20-2.15B(2)	Plastic pipe irrigation line	20-7
24-1.02	Lime	24-1
51-1.12F(3)	Preformed elastomeric joint seal	51-19
51-1.12H(1)	Plain and fabric reinforced elastomeric bearing pads	51-22
51-1.12H(2)	Steel reinforced elastomeric bearing pads	51-24
51-1.14	Waterstops (Special Condition)	51-26
52-1.02B	Epoxy coated bar reinforcement	52-1
52-1.04	Reinforcing steel	52-3
55-1.03	Structural Steel	55-2
57-1.02A	Structural Timber & Lumber	57-1
57-1.02A	Treated Timber & Lumber	57-1
58-1.03	Lumber and timber	58-1
61-1.02	Culvert and drainage pipe joints	61-3
64-1.02	Plastic pipe	64-1
65-1.02A(2)	Reinforced concrete pipe	65-4
66-2.02	Aluminum pipe and aluminum pipe arch	66-4
66-3.02	Corrugated steel pipe and corrugated steel pipe arch	66-5
67-1.02	Structural metal plate pipe arches and pipe arches	67-1
68-1.02F	Perforated steel pipe	68-2
68-1.02J	Aluminum underdrain pipe	68-3
68-1.02K	Polyvinyl chloride pipe or polyethylene tubing	68-3
69-1.02A	Steel entrance tapers, pipe downdrains, reducers, coupling bands and slip joints	69-1
69-1.02F	Aluminum entrance tapers, pipe downdrains, reducers, coupling bands and slip joints	69-2
82-1.02D	Metal target plates	82-3
84-3.02	Paint (Traffic stripe)	84-3
86-2.08	Conductors	86-18
86-2.16	Painting of electrical equipment	86-33
86-4.01C	Electrical Components	86-43
88-1.01	Engineering fabric	88-1
90-2.01	Portland Cement	90-3
90-2.02A	Concrete coarse aggregate (Cleanness value)	90-5
90-2.02B	Concrete fine aggregate (Sand equivalent)	90-6
90-4.03	PCC admixtures	90-10
90-10.03	Minor concrete	90-33
92-1.03	Asphalt (Oil)	92-2
93-1.02	Liquid asphalt	93-2
94-1.05	Asphaltic emulsion	94-6
95-1.02	Epoxy	95-1

**SIZE, FREQUENCY AND LOCATION OF SAMPLING AND TESTING TABLES**  
PORTLAND CEMENT CONCRETE (6) - PAVEMENT

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS		
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING			
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.) 6	See Note (3)	See Note (2)	1 for every 500 cu. yds. 1 per day min. See Notes (1)(7). If production is less than 300 cu. yds, 1 per accumulative 300 cu. yds.	One of the following locations listed in order of preference: a. Belt from weigh hopper to central or transit mixer. b. Belt which feeds batch plant bins immediately preceding the weigh hopper. c. Discharge gate of weigh hopper. A single sample 400+ lbs. into loader or dump truck; split to test portion required for grading analysis. d. Discharge gates of bins feeding the weigh hopper at batch plant	Recommend 1 acceptance test per day if 3 consecutive tests over 80		
		Cleanness value						211 227	
	FINE AGGREGATE	Colometric Test	213	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected	The location and method of sampling are to be determined and agreed upon by the engineer and the contractor. Once selected, the location and method of sampling are not to be changed during the life of a project, or so long as there is no change in plant's configuration or operation.	Recommend 1 acceptance Test per day if 3 consecutive tests over 80	
		Mortar Strength	515						
		Sand Equivalent	217						
		Durability	229						
	COARSE & FINE AGGREGATE	Specific gravity & absorption	206 & 207	See Note (3)	See Note (2)	When aggregate changed. See Note 7	Same as Fine Aggregate (above)		
		Soundness	214						
		Sieve Analysis	202						
		Freeze-Thaw	528						See Note (4)
Moisture		223 & or 226							None
CEMENT	Compliance w/Std. Specs. & Special Provisions		8 lb.	None with Certificate of Compliance (See REMARKS.)	1 for every 500 cu. yds. 1 per min. See Notes (1)(7). If production is less than 300 cu. yds, 1 per accumulative 300 cu. yd.	Weigh hopper or in the feed line immediately in advance of the hopper	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands.		
WATER	Compliance with Sec. 90 of Std. Specs. & Special Provisions	405	Clean 1/2 gallon plastic jug with lined sealed lid	At point of use (See REMARKS)KS)	As required for acceptance (See REMARKS)	At point of use	City water supplies for domestic use usually need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested.		

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

AD MIXTURES	Air Entraining Agent	Air entraining properties, chloride identification	ASTM C 260	1-quart can or plastic bottle of liquid, 2 lbs. of powder	Samples must reach testing lab at least 1 week prior to use.	As required for information	Sample must reach testing lab at least 1 week prior to use	
	Water Reducers Set Retarders	Claimed properties, chloride identification	ASTM C 494	1-quart can of liquid, 2 lbs. of powder	Samples must reach Testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	As new supplies arrive on the job or each time brand is changed.	Samples must reach testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	
CONCRETE	Yield		518	See test method See Note (8)		One for each 4 hours production	At point it is deposited on the grade	If yield test used for payment, 1 per each 1,500 cu. yds.; min. of 2 per mix design per job.
	Ball Penetration		533			When test specimen is fabricated & when consistency or uniformity is questionable. Min. 2 per day	At point concrete is deposited in the work and from different portions of the batch to check uniformity.	
	Modules of rupture		523	1 set of 3 beams 6" x 6" x 34" each	See California Test 539	One set for each 4,000 cubic yards	See California Test 539	Recommend min. 2 sets per shift. Normally, from each set, break 1 beam at 7 days, 1 beam at 10 days, and 3rd beam as required 50% decrease after 10 sets.
	Air Content		504	Approx. 1/2 cubic foot		As required for information; min. once every 4 hours. Each time 518 is performed.	At point deposited on the grade.	Where specified for freeze thaw resistance, acceptance testing shall not be less than once every hour.
	Coarse agg. per cu. ft. of concrete		529			As required to assure uniformity of concrete. See Std. Specs., Section 90	1st and last 4th of batch	
	Dimensions					As required for information. See Std. Specs. Section 40		
PIGMENTED CURING COMPOUND	Compliance (See Std. Specs. & Special Prov.)			1 Quart (Can)		As new shipments arrive on job or each time brand is changed	From spray nozzle or feed line at point of field application.	

- Note:
- (1) Not required if P.C. from same source is being used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.
  - (2) From material site or stockpile; 60 days prior to use.
  - (3) 150# of 2 1/2" x 1 1/2" - 100# of 1 1/2" x 3/4" - 75# of 3/4" x No. 4-75# of pea gravel -50# of sand. This material for test numbers 202, 206, 207, 211, 213, 214, 217, 227, 229 and 515.
  - (4) See California Test No. 528 or contact the Division of New Technology, Materials and Research.
  - (5) Contact District Materials Engineer for special sampling procedures at least 120 calendar days before intended use.
  - (6) For lightweight concrete, see Standard Specifications and Special Provisions.
  - (7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.
  - (8) No deductions for cement content will be made based on the results of California test 518.

PORTLAND CEMENT CONCRETE (6) - BRIDGES & MAJOR STRUCTURES (R.C.B., P.C.C. Arch Culverts, Retaining Walls)

				POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS			
MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS	
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.) Cleanness Value	211 227	See Note (3)	See Note (2)	1 for every 500 cu. yds. 1 per day min. See Notes (1)(7). If production is less than 300 cu. yds, 1 per accumulative 300 cu. yds.	One of the following locations listed in order of preference: a. Belt from weigh hopper to central or transit mixer. b. Belt which feeds batch plant bins immediately preceding the weigh hopper. c. Discharge gate of weigh hopper. A single sample 400+ lbs. into loader or dump truck; split to test portion required for grading analysis. d. Discharge gates of bins feeding the weigh hopper at batch plant	Recommend 1 acceptance test per day if 3 consecutive tests over 80
	FINE AGGREGATE	Colometric test Mortar Strength Sand Equivalent Durability	213 515 217 229	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected  1 for every 500 cu. yds. See Notes (1) (7). If production is less than 300 cu. yds., 1 per accumulative 300 cu. yds.	The location and method of sampling are to be determined and agreed upon by the engineer and the contractor. Once selected, the location and method of sampling are not to be changed during the life of a project, or so long as there is no change in plant's configuration or operation.	Recommend 1 acceptance test per day if 3 consecutive tests over 80
	COARSE & FINE AGGREGATE	Specific gravity & absorption Soundness Sieve Analysis Freeze-Thaw Moisture	206 & 207 214 202 528 223 &/ or 226	See Note (3)	See Note (2)	When aggregate changed. See Note (7)  1 for every 500 cu. yds. 1 per day min. See Notes (1)(7). If production less than 300 cu. yds, 1 per accumulative 300 cu. yd.  1 for every 500 cu. yds. 1 per day min. See Notes (1)(7). If production less than 300 cu. yds, 1 per accumulative 300 cu. yd.	As per potential source list  Same Fine Aggregate (above)  Same Fine Aggregate (above)	Sample must be in an airtight container
CEMENT	Compliance w/Std. Specs. & Special Provisions		8 lb.	None with Certificate of Compliance (See REMARKS.)	1 for every 500 cu. yds. 1 per min. See Notes (1)(7). If production is less than 300 cu. yds, 1 per accumulative 300 cu. yd.	Weigh hopper or in the feed line immediately in advance of the hopper	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands.	
WATER	Compliance with Sec. 90 of Std. Specs. & Special Provisions	405	1/2 gallon plastic jug with lined sealed lid	At point of use (See REMARKS.)	As required for acceptance (See REMARKS)	At point of use	City water supplies for domestic use need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested.	

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

ADMIXTURES	Air Entraining Agent	Air entraining properties, chloride identification	ASTM C 260	1-quart can or plastic bottle of liquid, 2 lbs. of powder	Samples must reach testing lab at least 1 wk prior to use.	As required for information	Sample must reach testing lab at least 1 week prior to use	Check with DNTM&R for brands which may be used prior to sampling and testing when properly certified
	Water Reducers Set Retarder	Claimed properties, chloride identification	ASTM C 494	1-quart can of liquid, 2 lbs. of powder	Samples must reach testing lab at least 1 wk prior to use. Untested brands require 5 wks prior to use.	As new supplies arrive on the job or each time brand is changed.	Samples must reach testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	
CONCRETE	Yield		518	Approx. 1 cu. ft. See Note (8)	See California Test 539	As necessary to assure accuracy of mix design; min. 2 per each mix design	At point it is deposited in the work	
	Ball Penetration		533			When test specimen is fabricated & when consistency or uniformity is questionable. Min. 2 per day	At point concrete is deposited in the work and from different portion of the batch to check uniformity	
	Compressive Strength		539 & 540	1 set of 2-6" x 12" cylinders for each test age		1 set for approx. every 300 cu. yds. concrete or as required for acceptance. Min. 1 set per job & class of concrete for each days production.	At point deposited in the work	For trial batches, see Std. Specs. or job Special Provisions and Section 8-03 of this manual.
	Air Content		504			A Min. once every 4 hours of production and when test specimens are fabricated	At point deposited on the grade.	Where air is specified for freeze-thaw resistance, a min. of 1 per each 30 cu. yds.
	Coarse agg. per cu. ft. of concrete		529			As required to assure uniformity of concrete. See Std. Specs., Section 90	1st and last 4th of batch	
	Dimensions					As required for information. See Std. Specs. Sec. 40		
PRESTRESSED TENDON GROUT	Efflux time		541	1-6" x 12" cylinder mold can	From batch immediately after mixing for prequalification; thereafter from outlet end of tendon &/or storage tank.	At the start of each day's work and thereafter 1 test per each 5% of ducts		Repeat acceptance tests whenever source of material is changed
PIGMENTED CURING COMPOUND	Compliance (See Std. Specs. & Special Prov.)			1 Quart (Can)		Periodically to ensure compliance	From storage drums	For chlorinated rubber base type, sample and test if not previously inspected at the source.

- Note:
- (1) Not required if P.C. from same source is being used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.
  - (2) From material site or stockpile; 60 days prior to use.
  - (3) 150# of 2 1/2 x 1 1/2"-100# of 1 1/2 x 3/4 - 75# of 3/4" x No. 4-75# of pea gravel -50# of sand. This material for test numbers 202, 206, 207, 211, 213, 214, 217, 227, 229 and 515.
  - (4) See California Test 528 or contact the Division of New Technology, Materials and Research.
  - (5) Contact District Materials Engineer for special sampling procedures at least 120 calendar days before intended use.
  - (6) For lightweight concrete, see Standard Specifications and Special Provisions.
  - (7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.
  - (8) No deductions for cement content will be made based on the results of California Test 518.

PORTLAND CEMENT CONCRETE MISCELLANEOUS CONCRETE  
See Notes (6) and (9)

				POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS			
MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS	
AGGREGATE	COARSE AGGREGATE	LA Rattler (500 Rev.)	211	See Note (3)	See Note (2)	1 for every 500 cu. yds. 1 per day min. See Notes (1)(7). If production is less than 300 cu. yds, 1 per accumulative 300 cu. yds.	One of the following locations listed in order of preference: a. Belt from weigh hopper to central or transit mixer. b. Belt which feeds batch plant bins immediately preceding the weigh hopper. c. Discharge gate of weigh hopper. A single sample 400+ lbs. into loader or dump truck; split to test portion required for grading analysis. d. Discharge gates of bins feeding the weigh hopper at batch plant	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Cleanness Value	227					
	FINE AGGREGATE	Colometric Test	213	See Note (3)	See Note (2)	Only if initial test shows critical or contamination is suspected	The location and method of sampling are to be determined and agreed upon by the engineer and the contractor. Once selected, the location and method of sampling are not to be changed during the life of a project, or so long as there is no change in plant's configuration or operation.	Recommend 1 acceptance test per day if 3 consecutive tests over 80
		Mortar Strength	515					
		Sand Equivalent	217					
		Durability	229					
COARSE & FINE AGGREGATE	Specific gravity & absorption	206 & 207	See Note (3)	See Note (2)	When aggregate changed.			
	Soundness	214						
	Sieve Analysis	202						
	Freeze-Thaw	528	See Note (4)	See Note (5)				
	Moisture	223 & / or 226		None	1 for every 500 cu. yds. 1 per day min. See Notes (1) (7). If production less than 300 cu. yds, 1 per accumulative 300 cu. yd.	Same as Fine Aggregate (above)		
CEMENT (6)	Compliance w/Std. Specs. & Special Provisions		8 lb.	None with Certificate of Compliance (See REMARKS.)	1 for each 500 cu. yds. used. 1 per day min.: 2 per day max. See Note (1). See Section 8-02 of this Construction Manual	From weigh hopper, screw leading to weigh hopper	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands, 35 days for untested brands.	
WATER	Compliance with Sec. 90 of Std. Specs. & Special Provisions	405	1/2 gallon plastic jug with lined sealed lid	At point of use (See REMARKS.)	As required for acceptance (See REMARKS.)	At point of use	City water supplies for domestic use usually need not be tested unless suspected of high chloride or sulfate content. On-the-job wells are to be tested.	

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

ADDITIONAL TESTS	Air Entraining Agent	Air entraining properties, chloride identification	ASTM C 260	1-quart can or plastic bottle of liquid, 2 lbs. of powder	Samples must reach testing lab at least 1 week prior to use.	As required for information	Samples must reach testing lab at least 1 week prior to use.	Check with DNTM&R for brands which may be used prior to sampling and testing when properly certified.
	Water Reducers Set Retarder	Claimed properties, chloride identification	ASTM C 494	1-quart can of liquid, 2 lbs. of powder	Samples must reach Testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	When new lots are to be used.	Samples must reach testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	
COMBINED MIX (6)	Yield Cement Factor		518	See test method See Note (8)		As necessary to assure accuracy of mix design	At point concrete is deposited in the work from different portions of the batch to check uniformity	If yield test used for payment, 1 per each 1,500 cu. yds.; min. of 2 per mix design per job.
	Ball Penetration		533			When test specimen is fabricated & when consistency or uniformity is questionable. Min. 2 per day		
	Compressive Strength		539 & 540	1 set of 2-6" x 12 cylinders		One set for each day when volume exceeds 25 cu. yd. (1) None if total days run less than 25 cu. yds.	At point deposited in work	
	Entrained Air		504	Approx. 1/2 cubic foot		As required for information	At point concrete is deposited in work	

- Note:
- (1) Not required if P.C. C. from same source is being used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.
  - (2) From material site or stockpile; 60 days prior to use.
  - (3) 150# of 2 1/2" x 1 1/2" - 100# of 1 1/2 x 3/4 - 75# of 3/4" x No. 4-75# of pea gravel -50# of sand. This material for test numbers 202, 206, 207, 211, 213, 214, 217, 227, 229 and 515.
  - (4) See California Test 528 or contact the Division of New Technology, Materials and Research.
  - (5) Contact District Materials Engineer for special sampling procedures at least 120 calendar days before intended use.
  - (6) For minor concrete, sample and test only at Resident Engineer's discretion.
  - (7) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.
  - (8) No deductions for cement content will be made based on the results of California test 518.
  - (9) For lightweight concrete, see Standard Specifications and Special Provisions.

ASPHALT CONCRETE (3)

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	
AGGREGATE PRIOR TO MIXING	LA Rattler (500) Rev.)	211	Type A & B UNPROCESSED 250#  PROCESSED 50# of each bin size  Open graded 50#	Materials site, stockpile, or plant (7)	As necessary for information and/or acceptance (8)	Plant bin prior to mixing (2) (7)	
	Specific gravity (coarse and fine aggregate)	206 & 208					
	CKE	303					
	Stabilometer	366					
	Swell	305					
	Moist Vapor Susceptibility	307					
	% Crushed Particles	205					
	Sieve Analysis	202					
	Sand Equivalent	217					
	Film Stripping	302					
PAVING ASPHALT LIQUID ASPHALTIC EMULSION	In accordance with applicable Section of Std. Specs		Asphalt 1 quart can	Test only if no Certificate of Compliance. Asphalt line (6)	Once daily (6)	Asphalt line or distributor	
			Emulsion 1/2 gallon plastic jug	Test only if no certification of compliance. Emulsion Storage Tank	Each shipment	Emulsion Storage Tank or Distributor	

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

COMPLETE MIXTURE	Swell	305	DGAC 15# carton		As necessary for information and/or acceptance		When less than a total of 500 tons is to be placed, sample and test only at Resident Engineers discretion.  Total sample: DGAC: Four Cartons (about 60#) OGAC: Four 1 Qt. cans (about 14#)
	Moist, vapor susceptibility	307	OGAC 1 qt. can				
	Stabilometer	304					
	Sieve Analysis	202					
	Asphalt Content	310, 362 & 379			1 for each 500 ton; 2 per day minimum		
	Moisture	310 & 370				Completed pavement	
	In-Place Density	375	As specified or lot size		1 sample representing each 4 hours of production	As per California Test 375	
	Maximum Density	375	Two 15# cartons		As per California Test 375		

- Note:
- (1) On smaller projects being supplied from sources currently in use on larger projects, a copy of the acceptance test information on asphalt concrete aggregate is all that is required.
  - (2) For continuous mixing, sample from the combined feed in advance of mixing, for mixing, sample from hot bins.
  - (3) When special provisions state that production shall be "from commercial quality asphalt and aggregate" sample and test only at Resident Engineers discretion.
  - (4) Not required if P.C.C. from same source is being used on other work and test is being made there. No need to duplicate tests; results may be used anywhere they are applicable.
  - (5) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this material. Adjustments to testing frequencies shall be documented in the project files.
  - (6) When continuous mixing plants used, sample and test for specific gravity at least monthly.
  - (7) When sampling for AC mix design (California Test 367), aggregate samples must be taken as described in Note 2.
  - (8) Refer to Standard Specifications, 39-3.03 "Proportioning" for frequency of AC mix design (California test 367) sampling.
  - (9) When prior test results are acceptable and material appears to be of uniform composition, a max. of 2 tests per day will satisfy acceptance test requirements for this item. Adjustments to testing frequencies shall be documented in the project files.

LEAN CONCRETE BASE

			POTENTIAL SOURCE TESTS		ACCEPTANCE TESTS		
MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS
AGGREGATE	Sand equivalent	217	100 lbs. for aggregate qualification	Material site or stockpile	1 sample for each 3,000 tons or 2,000 cu. yds. (1)	One of the following locations listed in order of preference: a. Belt from weigh hopper to central or transit mixer. b. Belt which feeds batch plant bins immediately preceding the weigh hopper. c. Discharge gate of weigh hopper. A single sample 400+ lbs. into loader or dump truck; split to test portion required for grading analysis. d. Discharge gates of bins feeding the weigh hopper at batch plant The location and method of sampling are to be determined and agreed upon by the engineer and the contractor. Once selected, the location and method of sampling are not to be changed during the life of a project, or so long as there is no change in plant's configuration or operation.	
	Sieve analysis	202 & 105					
	Compressive strength of laboratory mixtures	548	As required for method of test for acceptance tests.				
CEMENT	Compliance with Section 90 of Std. Spec.		8 lbs.	None with Certificate of Compliance (see REMARKS)	Each 120 tons of cement, 2 per day max.	Weigh hopper or screw leading to weigh hopper or from distributor if road-mixed.	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands; 35 days for untested brands.
WATER	Compliance with Section 90 of Std. Spec.	405	Clean 1/2 gallon plastic jug with lined sealed lid.	At point of use(see REMARKS)		At point of use.	City water supplies for domestic use need not be tested unless suspected chlorine or sulfate content. On-the-job wells are to be tested
ADMIXTURES	Air Entraining Agents						Contact DNTM&R for information
	Retarders	Compliance with specifications	530 or 415	1 quart can or plastic bottle of liquid, 2 lbs. of powder	Each new lot of material brought to the job	Samples must reach testing lab at least 1 week prior to use. Untested brands require 5 weeks prior to use.	Contact DNTM&R for brands which may be used prior to sampling and testing when properly certified

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

COMPLETED MIXTURE	Penetration	533			At least once for every 4 hours of production	At point concrete is deposited in the work	
	Entrained Air	504	Approx. 1/2 cu. ft.	Request laboratory to perform this test during aggregate qualification.	At least once for each day's production		
	Dimensions				As required		
CURING COMPOUND	Compliance with specifications		1 quart can		Each new lot of material brought to the job	From spray nozzle or feed line at point of field application	

NOTE; (1) If material is uniform and well within specification limits, the frequency is decreased to 1 a day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.

CEMENT TREATED BASE ROAD MIX OR PLANT MIX

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS		
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING			
AGGREGATE	R-value (with & without cement)	301	100 lbs. for aggregate qualification	Material site or stockpile			Class B only		
	Compressive Strength	312					Class A		
	Sieve Analysis	202	As required for method of test for acceptance tests.				1 sample for each 3,000 tons or 2,000 cu. yds. (1)	As specified.	Minimum 1 acceptance test per project on smaller projects.
	Sand Equivalent	217					1 sample for each 3,000 tons or 2,000 cu. yds. (1)	As specified.	
COMPLETED MIX	Compressive Strength	312	See California Test 312 Part II		See Section 6-27 of this manual.	See California Test 312 Part II	Use minimum of 1 person full time during full-time operation.		
	Cement Titration	338	See California Test 338 Part I		As necessary for acceptance ( See REMARKS)	See California Test 338 Part I			
	Relative Compaction	312 216 231			1 sample for each 3,000 tons or 2,000 cu. yds. (1).	See California Test 375.			
	Dimensions				As necessary for information.	In place after compaction.			
CEMENT	Compliance with Section 90 of Std. Spec.		8 lbs.	None with Certificate of Compliance (see REMARKS)	Each 120 tons of cement, 2 per day max.	Weigh hopper or screw leading to weigh hopper or from distributor if road-mixed.	If no Certificate of Compliance, sample at least 14 days prior to use for previously tested brands; 35 days for untested brands.		
WATER	Compliance with Section 90 of Std. Spec.		1/2 gallon plastic jug with lined sealed lid.	At point of use(see REMARKS)	As necessary for acceptance (see REMARKS).	At point of use.	No sample necessary if from obviously suitable source such as municipal water supply. On-the-job wells should be tested.		
Liquid Asphalt	In accordance with Special. Prov. & Std. Specs.		1 quart can	None with Certificate of Compliance. If no Certificate of Compliance, then from storage tank of distributor truck.	Each shipment.	Distributor truck.			

NOTE: (1) If material is uniform and well within specification limits, the frequency is decreased to 1 a day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

**ASPHALT TREATED PERMEABLE BASE (ATPB)**

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	
AGGREGATE	Grading	202	50#	Materials, site, stockpile or plant bins.	2 times daily	Plant bins prior to mixing. See Note (1).	Recommend 1 acceptance test per day if 3 consecutive tests over 62.
	% crushed particles	205					
	LA Rattler (500 rev.)	211					
	Cleanness Value	227					
	Film Stripping	302					
ASPHALT	In accordance with Std. Specs.		quart can	Test only if no cert. of compliance	One daily.		
COMPLETED MIX	Asphalt content	310 & 362	Two 1-quart cans		1 for every 4 hours of production		

**CEMENT TREATED PERMEABLE BASE (CTPB)**

AGGREGATE	Grading	202	See note (2)	See note (3)	Once for each 4 hours of production. See note (4).	One of the following locations listed in order of preference: a. Belt from weigh hopper to central or transit mixer. b. Belt which feeds batch plant bins immediately preceding the weigh hopper. c. Discharge gate of weigh hopper. A single sample 400+ lbs. into loader or dump truck; split to test portion required for grading analysis. d. Discharge gates of bins feeding the weigh hopper at batch plant. The location and method of sampling are to be determined and agreed upon by the engineer and the contractor. Once selected, the location and method of sampling are not to be changed during the life of a project, or so long as there is no change in plant's configuration or operation..	Recommend 1 acceptance test per day if 3 consecutive tests over 80
	LA Rattler (500 rev.)	211			One for each 4 hours of production. See Note (4).		
	Cleanness Value	227					
CEMENT	Compliance w/ Std. Specs & Spec. Prov.		8 lbs.	None with Cert. of Compliance	Once for each 120 tons, 2 per day mix.		
WATER	Compliance with/ Sec 90 of Std. Specs and Special Provisions		1/2 gallon plastic jug with lined sealed lid.				City water supplies for domestic use; need not be tested unless suspected chlorine or sulfate content. On-the-job wells are to be tested.

- NOTE:
- (1) For continuous mixing plants, sample from combined feed in advance of mixing.
  - (2) 75 # of 1' x No. 3/4" x No. 4. This material for test numbers 202, 211, and 227.
  - (3) From material site or stockpile; 60 days prior to use.
  - (4) Not required if P. C. C. from same source is being used on other work and test is being made there. No need to duplicate the test just for the sake of record. The actual test results may be used anywhere they are applicable.

				MISCELLANEOUS MATERIALS			
				POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		
MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS
AGGREGATE BASE	% crushed Particles	205	100 # for initial samples. 50 # for control samples.	Materials site or stockpile.	As necessary for acceptance.	As specified	Minimum 1 acceptance test per project.
	Sieve Analysis	202			Every 3,000 tons or 2,000 cu. yds. (1).		Minimum 1 acceptance test per project on smaller projects.
	Durability Index	229			If initial source changes or new source developed.		
	R-Value	301			Every 3,000 tones of 2,000 cu. yds. (1)(2).		
	Sand Equivalent	217			Every 3,000 tones of 2,000 cu. yds. (1)		Minimum 1 acceptance test per project on smaller projects.
	Moisture	226			2 times daily if paid for by weight.	At time of weighing.	
	Relative Compaction	216 or 231			As necessary for acceptance.	In place after compaction.	
	Dimensions				As necessary for information	Upon completion of layer.	
AGGREGATE SUBBASE	Sieve analysis	202	50 #	Material site or stockpile.	1 for every 3,000 tons or 2,000 cu. yds. (1).	As specified.	Minimum 1 acceptance test per project on smaller project. None if less than 300 tons.
	R-value	301			1 for every 3,000 tons or 2,000 cu. yds. (1) (2).		
	Sand equivalent	217			1 for every 3,000 tons or 2,000 cu. yds. (1).		
	Relative compaction	216 or 231			As necessary for acceptance.	In place after compaction.	
	Dimensions				As necessary for information.	Upon completion of layer.	

- NOTE:
- (1) If material is uniform and well within specification limits, the frequency may be decreased to one a day unless source is changed. Adjustments to testing frequencies shall be documented in the project files.
  - (2) R-value testing may be waived when test records demonstrate that material from the same source, and having comparable grading and sand equivalent values, meets the minimum R-value requirements.

**MISCELLANEOUS MATERIALS**

				POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS			
MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS	
IMPORTED BORROW	Relative Compaction	216 or 231			As required for acceptance.	Immediately after material is placed and compacted		
BASEMENT SOIL	R-Value	301	50 #	Test material below grading plane, both in cut and in fill.	As necessary for acceptance.	Prior to placement of cover material.		
	Relative Compaction	216 or 231	30 #			Immediately prior to placement of cover material.		
	Grade Tolerance					Grading plane.		
EMBANKMENT	Relative compaction	216 or 231	30 #			In place after compaction.		
<b>LIME TREATMENT (1)</b>	Soil or Aggregate to be Treated	Unconfined compressive strength	301	100 #	Native soils. Test each type of material to be treated.	If initial source changes.	Prior to beginning of lime treatment.	To determine appropriate lime content.
	COMPLETED MIX	Lime Content	338	20 #		As necessary for acceptance.	See California Test 338, Part I	
		Relative Compaction	216 & 231				In place after compaction.	
		Dimensions					In place after compaction.	
LIME	Compliance with Special Provisions		1/2 gallon can with friction lid	None with Certificate of Compliance.	Each load delivered.	From distributor.		
EMULSION (CURING SEAL)	In accordance with Special Provisions and Standard Specifications		1/2 gallon plastic jug.	None with Certificate of Compliance. If no Certificate of Compliance, then from storage tank or distributor truck.	Each shipment.	Distributor truck.		

NOTE: (1) Not to be used for the lime treatment of AC aggregates.

				MISCELLANEOUS MATERIALS					
MATERIAL OR PRODUCT		TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS LOCATION OR TIME OF SAMPLING	ACCEPTANCE TESTS FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	REMARKS	
PENETRATION TREATMENT	LIQUID ASPHALT	In accordance with applicable section of Std. Specs.		1 quart can	None with Certificate of Compliance.	Each shipment.	Plant storage tank or distributor.		
	SAND	Sieve Analysis	202			As necessary for acceptance.	As delivered to project.		
BITUMINOUS SEALS	PAVING ASPHALT	In accordance with applicable section of Std. Specs		Asphalts 1 quart can , Emulsion 1/2 gallon plastic jug	None with Certificate of Compliance.	Each shipment.	Storage tank or distributor		
	LIQUID ASPHALT	Binder distribution	339						
	ASPHALTIC EMULSION	LA Rattler	211		Stockpile	As necessary for acceptance..	As delivered to spread, equipment.		
	SCREENINGS	% crushed particles	205	50 #		Twice daily.			
		Sieve Analysis	202			As necessary for acceptance.			
		Film Stripping	302			Once daily			
		Cleanness Value	227			As necessary for acceptance	Prior to mixing		
		Sand Equivalent	217		Stockpile				
		SLURRY SEAL AGGREGATE	Sieve Analysis	202	25#				
			Film Stripping	302					
SOLID OR SEMI-SOLID AIR REFINED ASPHALT	In accordance with Std. Specs			3 #	Barrels or sacks.	Each 29 barrels or sacks.	Barrels or sacks.		

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

**MISCELLANEOUS MATERIALS**

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	
PERMEABLE MATERIAL	Sieve Analysis	202	150 #	Stockpile	1 daily, or as required for acceptance.	In place, at time of placing.	Minimum 1 acceptance test per project.
	Durability Index	229			If initial source changes or new source developed.	Material site or stockpile	
	Sand Equivalent	217			1 daily, or as required for acceptance.	In place, at time of placing.	
STRUCTURE BACKFILL	Sieve Analysis	202	50 #	Materials site.	As required for acceptance.	At time of use	
	Sand Equivalent	217					
	Relative Compaction	216 & 231				In place after compaction.	
SLOPE PROTECTION	Size		75 #	Quarry	As required for acceptance (See REMARKS)	Upon delivery to job site or at time of placing.	Adequate size of slope protection documented by measuring or weighing the material.
	Apparent Specific Gravity	206					
	Absorption	206					
	Durability Index	229					
ASBESTOS SHEET PACKING			12" X 12"		1 each lot.	At delivery	Sample and test if not previously inspected at the source.
ASPHALT PLANK			Contact DNTM&R for instructions.		Contact DNTM&R for instructions.		
BARBED WIRE			3' length		Each 50 rolls or fraction	At time of use.	Sample and test if not previously inspected at the source. If less than 500 LF. of fence, see Note (1).
BOLTS AND HARDWARE			2 samples each diameters		Each lot.		Sample and test if not previously inspected at the source.

NOTE: (1) Resident Engineer may accept on the basis of visual examination provided the source has recently furnished similar material found to be satisfactory under the normal sampling and testing procedures of the Department. Place Resident Engineer's written approval in the project file.

**MISCELLANEOUS MATERIALS**

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	
BRICK	Compliance with Specifications		10 full size		Contact DNTM&R for instructions.	At time of use	
CHAIN LINK FENCING			24" width		Each 50 rolls or fraction.		Sample and test if not previously inspected at the source. If less than 500 LF of fence, see note (1).
CONCRETE AND CLAY PIPE			Contact DNTM&R for instructions.		Contact DNTM&R for instructions.		Sample and test if not previously inspected at the source. If less than 100 LF. of fence, see Note (1).
JOINT FILLER EXPANSION			6" long full width of sheet		Each 1,000 sq. ft. not less than 2 per shipment.		Sample and test if not previously inspected at the source. If less than 100 sq. ft. see Note (1).
ELECTRICAL CONDUCTOR	Compliance with Specifications		2 each 3" long, include markings		Each type each lot.		Sample and test if not previously inspected at the source. Certificate of Compliance required for 5,000 volt cable.
GALVANIZED PIPE			1' length from each end of length tested of each size		Each 500 lengths or fraction		Sample and test if not previously inspected at the source.
GEO-SYNTHETICS Filler, Reinf. & Paving Fabric S/R Fence, Etc.			1 piece, 3' x full width of roll		Each lot.	Distribution Warehouse.	Certificate of Compliance required for each lot. Unroll at least 1 circumference before sampling.
JOINT SEAL, Type B			Contact DNTM&R			At time of use.	Sample and test if not previously inspected at the source.
JOINT SEALING COMPOUND 2-COMPONENT POLYSULFIDE POLYMER TYPE	Specification requirements		1 gallon of each component		1 sample from each component of each batch	From cans at job site.	
MOPPING ASPHALT	Compliance with Specification		1 quart		Each lot.	At time of use.	Sample and test if not previously inspected at the source.
PAINT	Compliance with Specification		For Br. or major Str. send an unopened 5 Gal. can. For misc. painting, 1 qt. (See Sec. 8-02)		Each batch		Unused portion of 5 gallon sample will be returned to job. See Section 8-02. If less than 20 gallons, see note (1).
PAVEMENT MARKERS	Compliance with Specification		20 Markers		1 Sample (20 markers) from each lot of 10,000		Sample and test if not previously inspected at the source
PLASTIC CONDUIT	Compliance with Specification		2" long from center of length		2 samples each size		Sample and test if not previously inspected at the source
RAISED BARS (PRECAST)	Compliance with Specification		1 unit or full size bar		Each lot		Sample and test if not previously inspected at the source
REINFORCING STEEL	Compliance with Specification		2 samples 30" except 36" for #14 & #18		As necessary for acceptance	Before use	Sample and test at job site

NOTE: (1) Resident Engineer may accept on the basis of visual examination provided the source has recently furnished similar material found to be satisfactory under the normal sampling and testing procedures of the Department. Place Resident Engineer's written approval in the project file.

**EXHIBIT 16-R**  
**Size Frequency and Location of Sampling and Testing Tables**

**MISCELLANEOUS MATERIALS**

MATERIAL OR PRODUCT	TEST FOR	TEST NO.	SAMPLE SIZE & CONTAINER TYPE	POTENTIAL SOURCE TESTS	ACCEPTANCE TESTS		REMARKS
				LOCATION OR TIME OF SAMPLING	FREQUENCY OF SAMPLING	LOCATION OR TIME OF SAMPLING	
STEEL PRODUCTS			Contact DNTM&R for instructions.		Contact DNTM&R for instructions.	At time of use	Sample and test if not previously inspected at the source.
STRUCTURAL STEEL & MISC. IRON & STEEL			2 samples, 2" x 30" cut parallel to direction of rolling		Each heat or melt or 10 tons or fraction.		Sample and test if not previously inspected at the source
WATER-PROOFING MATERIALS		ASTM D173	1 sq. yd. of asphalt saturated cotton fabric		1 sample from each lot.	Manufacturer's stock or contractor yard.	Meshes of fabric shall be substantially open
		ASTM D449	5 pounds of asphalt				Contractor's stock must be kept covered.
		ASTM D41	1 quart of asphalt primer.				
WIRE MESH REINFORCING			3' x 3'		Each 10 tons or fraction.	At time of use.	Sample and test at if not previously inspected at the source. If less than 2 rolls, see note (1).
WIRE ROPE OR CABLE			Per Special Provisions or as instructed.		Per Special Provisions or as instructed. At time of use.		Sample and test if not previously inspected at the source.

NOTE: (1) Resident Engineer may accept on the basis of visual examination provided the source has recently furnished similar material found to be satisfactory under the normal sampling and testing procedures of the Department. Place Resident Engineer's written approval in the project file.