

ADOT's Materials Quality Assurance Program



Presentation by Chad Auker

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TRB Definition

Quality

- 1) The degree of excellence of a product or service
- 2) The degree to which a product or service satisfies the needs of a specific customer
- 3) The degree to which a product or service conforms with a given requirement

ADOT QAP Definition

Quality

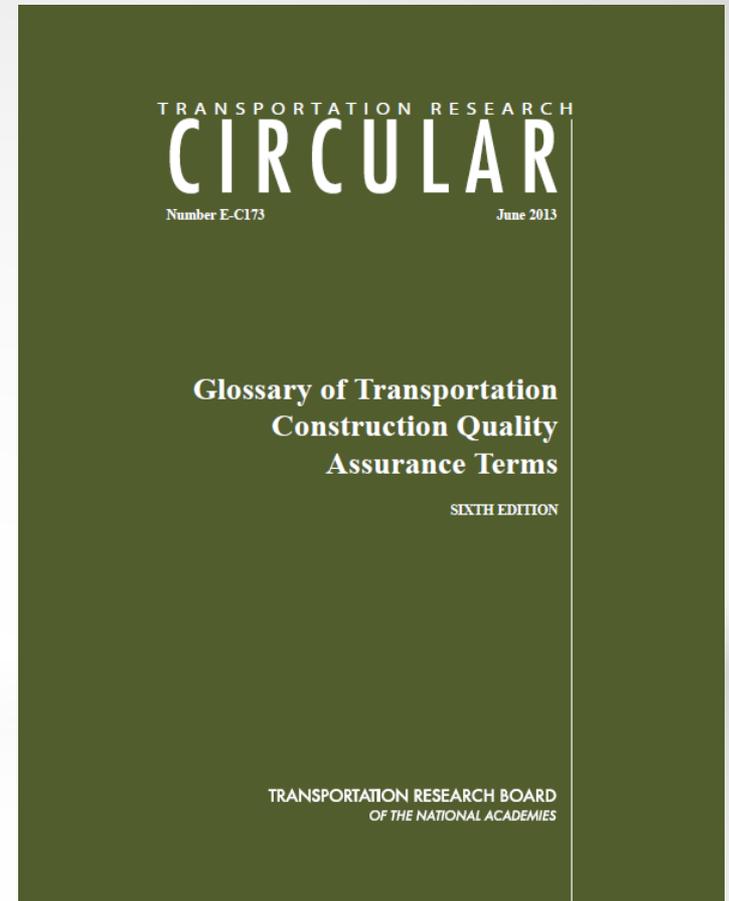
“Consistently conforming to mutually agreed upon requirements.”

ADOT’s Material Quality Assurance Program – Glossary of Terms (17 Quality Assurance Terms)

Core Quality Assurance Terms

TRB Glossary

- ▶ **Transportation Research Board – Glossary of Transportation Construction Quality Assurance Terms**
- ▶ **155 Quality Assurance terms**
- ▶ **Additional Resource – AASHTO R10-06 (2011)**



<http://onlinepubs.trb.org/onlinepubs/circulars/ec173.pdf>

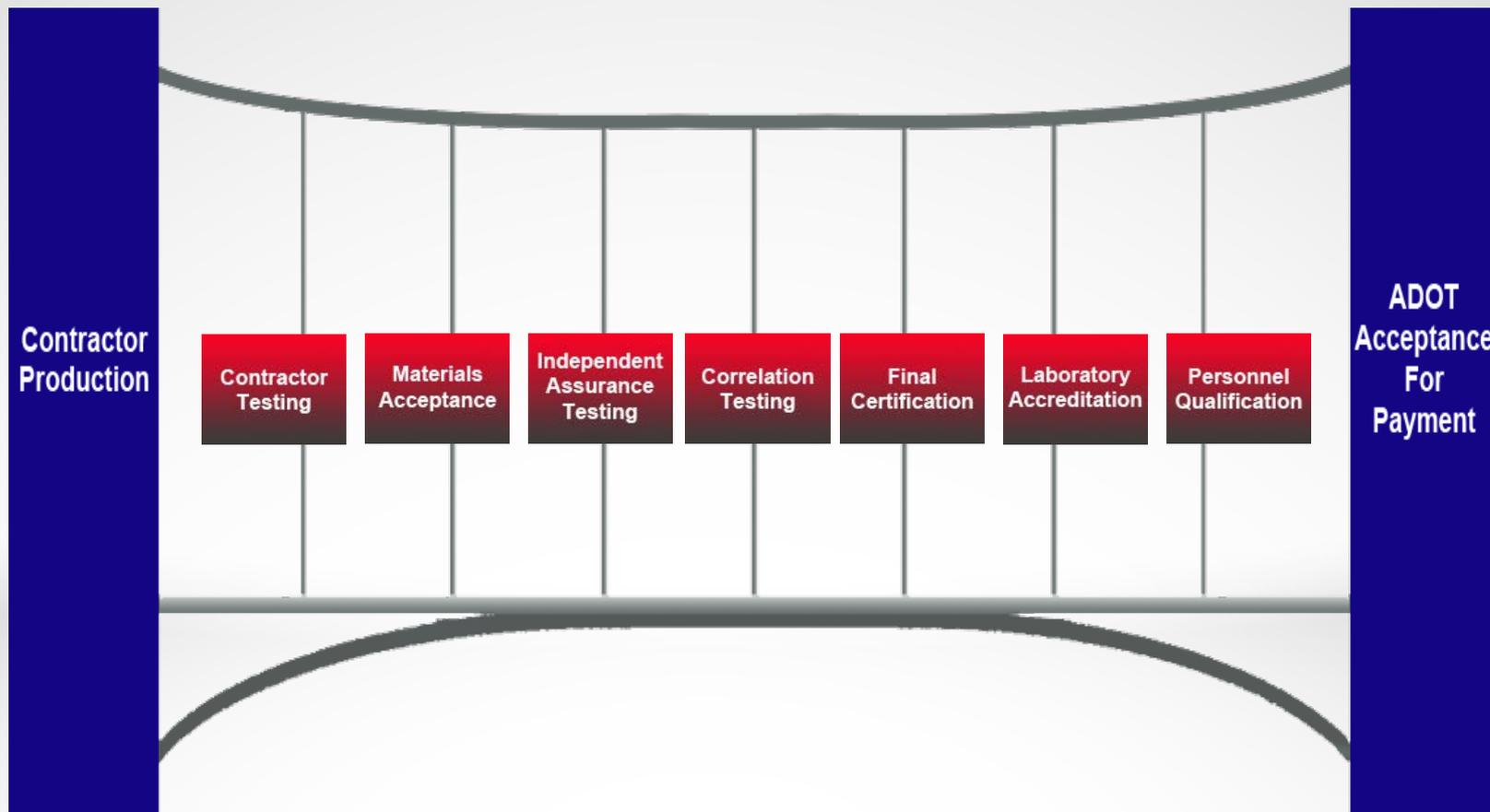
Core Quality Assurance Terms



Quality Assurance (TRB)

- 1) All those **planned and systematic actions** necessary to provide confidence that a product or facility will perform satisfactory in service; or
- 2) Making sure the quality of a product is what it should be.

ADOT's Materials Quality Assurance Program



23 CFR 637, Subpart B

ADOT's Quality Assurance Elements

Contractor Testing

- ▶ Quality Control –The system used by a contractor to monitor, assess and adjust their production or placement processes to ensure that the final product will meet the specified level of quality.



ADOT's Quality Assurance Elements

- ▶ Quality Control – AKA Process Control in ADOT's QAP. Includes:
 - ▶ Sampling (Random)
 - ▶ Testing
 - ▶ Inspection
 - ▶ Corrective Action

ADOT's Quality Assurance Elements

Materials Acceptance

- ▶ Acceptance Sampling and Testing
- ▶ Acceptance based on Certification (Series 1000)
- ▶ Approved Products List (ATRC's Product Evaluation Program)

ADOT Resources and Risks determine the type of acceptance

Materials Acceptance

- ▶ Acceptance Sampling and Testing – sampling and testing performed by the agency, or its designated agent, to evaluate acceptability of the final product.
- ▶ ADOT's Responsibility
- ▶ **Random** and **Representative** Samples are MANDATORY
- ▶ Chain of Custody remains with ADOT

Materials Acceptance

Sampling Guide Schedule

- ▶ Appendix C of the QAP – Acceptance Sampling Guide
- ▶ Type of Material
- ▶ Tests Required
- ▶ Sampling Point
- ▶ Minimum Sampling Frequency

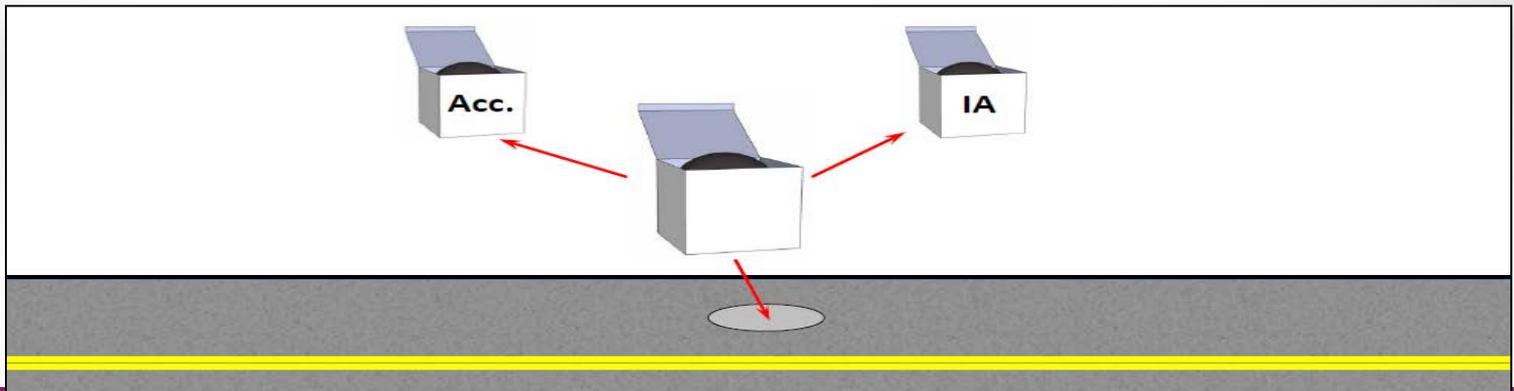
TABLE 7 (continued)
ACCEPTANCE SAMPLING GUIDE FOR BITUMINOUS MIXTURES

SPECIFICATION SECTION	MATERIAL	TYPE OF TEST(S) REQUIRED	SAMPLING POINT	MINIMUM SAMPLING FREQUENCY
416	Asphaltic Concrete - End Product [For mixes containing reclaimed asphalt pavement (RAP), see PPD ⁽³⁾ .]	% Asphalt ⁽¹⁾	Roadway	4 per lot.
		Moisture Content ⁽¹⁾		
		Gradation ⁽¹⁾		
		Marshall ⁽¹⁾ [Density, Stability, and Flow]		
		Rice ⁽¹⁾	Roadway	20 cores per lot (10 locations/2 cores per location).
		Compaction, unless otherwise specified. (Courses > 1½ inch in nominal thickness)		

⁽¹⁾ Independent Assurance Sampling and Testing required.
⁽³⁾ ADOT Materials Policy and Procedure Directive.

ADOT's Quality Assurance Elements

- ▶ **Independent Assurance (IA)** – Activities that are an unbiased and independent evaluation of all the sampling and testing procedures used in the acceptance program.
- ▶ Independent Verification of procedures and equipment



Independent Assurance (IA)

- ▶ Project Based Approach - IA evaluation based on a specified frequency for materials on an individual project
- ▶ Split Samples between Regional Lab and Acceptance Lab
- ▶ Timely Comparison and Reporting of all test results
- ▶ Frequency depends on type of material

TRACS #: H413401C															Contractor: FANN CONTRACTING, INC																													
Project Name: SR 89A /J W POWELL BLVD TI															District: Flagstaff																													
Material Type: Asphaltic Concrete															3/4" Asphaltic Concrete																													
Sample Location: Beulah Blvd 8' west of CL															Sample Date: 10/31/2014															Sample Received: 10/31/2014 09:50 am														
Location of Supply: Gray Mtn.															Sampled By: Rod Vance															Tested By (Lab): Flagstaff Regional Lab														
															I.A. Sample ID #: IAS-637															Tested By (Lab): Flagstaff Area														
															I.A. Split ID #: 637																													

	2"	1 1/2"	1"	3/4"	1/2"	3/8"	1/4"	#4	#8	#16	#30	#40	#50	#100	#200	Stab	Eff Void	Bulk	% Asph	Flow	Rice
I.A. Sample Test Results	100	100	100	97	85	73	66	60	42	29	19	15	13	9	6.8	3360	5.1	154.4	4.80	10	162.7
I.A. Split Test Results	0	0	0	96	83	74	65	59	42	28	18	15	12	8	6.1	3410	5.0	154.4	4.66	9	162.5
Variation (I.A. vs. Split)	0	0	0	1	2	1	1	1	0	1	1	0	1	1	0.7	30	0.1	0.0	0.14	1	0.2
Allowable Variation (+/-)	4	4	4	4	4	4		4	4			2			1.0	1200	1.5	2.0	0.40		2.0

Unfavorable Comparison (X):

Favorable Comparison Yes No

I.A. Sample is Complete Yes No a7198 11/05/2014 12:42 pm

Acceptance Lot is Complete Yes No a1871 11/03/2014 12:07 pm

Individual Contacted and Date/Time Acceptance Lab Notified: TIM MACIAS 11/05/14 12:45

Action Taken: _____

Independent Assurance (IA)

- ▶ **System Based Approach** - IA evaluation based on observing and verifying satisfactory performance of an individual performing acceptance sampling and testing and the equipment utilized for a 12 month period.
- ▶ Performance and Equipment
- ▶ Recently included in ADOT's QAP
- ▶ Tracking in database that is shared by QA and the Regional Labs
- ▶ Density testing and concrete field testing



ADOT's Quality Assurance Elements

- ▶ **Correlation Testing** – Correlation testing supplements IA sampling and testing
- ▶ Every 5th acceptance sample is split between Project Lab and Regional/Central Lab for most material types
- ▶ Timely Comparison and Reporting of all testing

ADOT's Quality Assurance Elements

Laboratory Qualifications

- ▶ **Accredited Laboratory** – A laboratory that is recognized by a formal accrediting body as meeting quality system requirements including demonstrated competence to perform standard test procedures.
- ▶ AAP (AASHTO Accreditation Program)
- ▶ ADOT Laboratory Inspection Program
- ▶ ADOT Proficiency Program



ADOT's Quality Assurance Elements

- ▶ ADOT System for the Evaluation of Testing Laboratories – PPD No. 19
- ▶ “Directory of Approved Material Testing Laboratories” – Materials Group Website
- ▶ Approved for each specific test that the lab is approved to perform



ADOT's Quality Assurance Elements

Personnel Qualifications

- ▶ **Certified technician** – A technician certified by some agency as proficient in performing certain duties. (A certified technician is considered to be qualified)
- ▶ ADOT recognizes the American Concrete Institute (ACI) and the Arizona Technical Training Institute (ATTI) for certification to perform materials sampling and testing

Personnel Qualifications

- ADOT requires the technician to be certified with the following certification for any sampling and testing performed for any ADOT projects.

TABLE 3 REQUIREMENTS FOR SAMPLING AND TESTING TECHNICIAN	
<u>Soils and Aggregate</u>	
<u>Field</u> Arizona Technical Testing Institute (ATTI) "Field" certification.	<u>Laboratory</u> Arizona Technical Testing Institute (ATTI) "Laboratory Soils/Aggregate" certification.
<u>Asphaltic Concrete</u>	
<u>Field</u> Arizona Technical Testing Institute (ATTI) "Field" certification.	<u>Laboratory</u> Arizona Technical Testing Institute (ATTI) "Asphalt" certification.
<u>Concrete</u>	
<u>Field</u> American Concrete Institute (ACI) "Concrete Field Testing Technician Grade I" certification.	<u>Laboratory</u> American Concrete Institute (ACI) "Concrete Strength Testing Technician" certification.

Personnel Qualifications - ATTI

- ▶ ADOT works in conjunction with ATTI to implement Arizona specific certifications
- ▶ Board of Directors and Technical Advisory Board with ADOT, LPA and Industry participation
- ▶ Two day review class for each ATTI Certification (Field, Lab Asphalt, Lab Soils/Aggregate)
- ▶ ATTI Exams included
 - Written (80 % min)
 - Calculation (100 % min)
 - Performance (100 % min)



Final Certification of Materials

- ▶ Documentation of material related activities
- ▶ Materials Certification
- ▶ Sample Checklist
- ▶ Certificate Log
- ▶ Document Exceptions to the Quality Assurance Program

MEMORANDUM

TO: (Name)
(District Name) District Engineer (Mail Drop)

THRU: (Name)
(Region Name) Regional Materials Engineer (Mail Drop)

FROM: (Name)
Resident Engineer (Mail Drop)

DATE: Mon. Day, Year

RE: MATERIALS CERTIFICATION / EXCEPTION REPORT

Fed. Proj. No. HSIP-TEA-085-B(203)A
TRACS No. H640701C
GILA BEND – BUCKEYE HIGHWAY (SR85)
(SR 85 at Gila Bend, Phase 1)

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications. In addition, all material sampling and testing was performed in accordance with the ADOT Materials Quality Assurance Program. Independent assurance sampling and testing, and correlation testing, were performed in accordance with the ADOT Materials Quality Assurance Program. Results of the IA and Correlation testing compared favorably with the results of acceptance sample testing.

Exceptions to the above certification are as follows:

1. Lots #1 and #2 of section 416 Asphaltic Concrete (End Product) paving, were in reject, but were allowed to remain in place at the maximum negative penalty (see Memo from Materials Group dated March 8, 2013).
2. Two-point barbed wire was installed rather than the 4-point barbed wire required in the project plans. This change was initiated by the State Game and Fish Department and is documented in Change Order #7.

Local Public Agency Requirements

- ▶ Appendix A of ADOT's QAP
- ▶ ADOT has defined the Quality Assurance requirements for Local Public Agencies with Certification Acceptance (CA) status to administer Federal-Aid projects on the NHS.
- ▶ Pre-construction approval by ADOT of Quality Assurance processes used on LPA projects



Local Public Agency Requirements

- ▶ **Must submit the following to ADOT QA Engineer:**
 - Bid Schedule showing bid items and quantities
 - Materials Sample Checklist showing scope of proposed sampling and testing
 - Materials Certificate Log listing materials to be accepted on Certificates during construction
 - Contractual relationship between all parties involved with the acceptance decision
 - Final Materials Certification



Materials Quality Assurance Program

Purpose

- ▶ Code of Federal Regulations (23 CFR 637, Subpart B) Requirements
- ▶ Provides verification that the materials that are sampled and tested satisfy the specification requirements
- ▶ Provides confidence in the reliability of test results performed by laboratories and technicians



ADOT's Quality Assurance

Inspection – the act of examining, measuring, or testing to determine the degree of compliance with requirements.

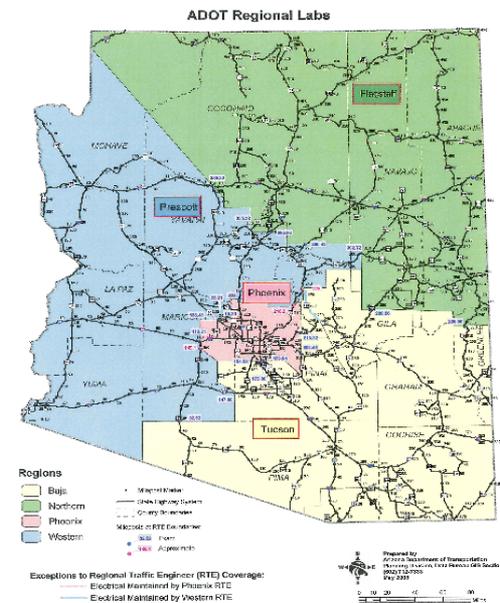
The ADOT Construction Group administers the Quality Assurance inspection program on ADOT projects.

- ✓ Resident Engineer / Construction Orgs
- ✓ Specifications, Training, Quantlists, IA, ETC



ADOT's Quality Assurance Program

- ▶ ADOT's Materials Group Quality Assurance Section is responsible for the administration of the Materials Quality Assurance Program
 - Quality Assurance Group (Central Lab) – Rehnuma Rahman, P.E.
 - Regional Materials Laboratories
 - Flagstaff – Nye McCarty, P.E.
 - Prescott – Jessica Banner, P.E.
 - Phoenix – Murari Pradhan, P.E.
 - Tucson – Sardar Chalabe, P.E.





Thank You!

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