

## Colorado Procedure 10-21

### *Standard Practice for*

## Qualification of Testing Personnel and Laboratories

### 1. INTRODUCTION

- 1.1 This procedure defines the requirements for qualification of people and laboratories. Specifically, all persons and all laboratories conducting tests used in mix design or acceptance must be qualified. Laboratories conducting Independent Assurance (IA) inspections for CDOT must be accredited and the people conducting these inspections must be certified.

### 2. SAMPLING AND TESTING PERSONNEL QUALIFICATIONS

- 2.1 All persons conducting or supervising tests used in mix design, acceptance, or IA must be qualified. The personnel conducting or supervising tests for the contractor's PC Program must be qualified. This includes mix design testing, verification testing by CDOT and designated agents (private laboratories), testing conducted by contractors and vendors and used in the acceptance decision (PC-For-Pay), and IA testing by CDOT and designated agents. The requirements to be qualified are stated below.
- 2.2 The person with overall responsibility for the sampling and testing on construction projects (the Project Engineer or Resident Engineer for CDOT and the Process Control Supervisor if non-CDOT) shall be a registered Professional Engineer in the State of Colorado or possess a National Institute for Certification of Engineering Technologies (NICET) Level III Certificate in Highway Materials or Construction Materials with the soil, concrete, and asphalt sub-fields.
- 2.2.1 Pursuant to Section 12-25-102(10) of the Colorado Revised Statutes all mix designs shall be sealed by a Registered Professional Engineer in the State of Colorado.
- 2.3 All personnel conducting Quality Assurance Testing and acceptance of materials on CDOT projects advertised after January 1, 2020, shall have successfully completed and passed the online e-learning CDOT Materials Technician Training Course offered through the CDOT Transportation Engineering Training Program (TETP). This online course can be accessed at the following link: <https://www.codot.gov/programs/tetp>. This is in addition to qualifications/certifications required for specific materials or test methods as listed in Table 10-1.
- 2.4 Persons performing sampling and testing used in the mix design, acceptance decision, PC, or IA testing shall be qualified by meeting the requirements listed in Table 10-1 and possessing current certifications.
- 2.3.1 To operate a nuclear device, CDOT personnel must possess a current certificate indicating that they have satisfactorily completed CDOT's School of Radiological Safety and Nuclear Gauge Operation. Non-CDOT operators of nuclear gauges must be certified as required by their company's Radioactive Materials License, issued by the Colorado Department of Public Health and Environment.

- 2.4 *New Employees:* New employees not qualified in accordance with Subsection 2.3 may conduct acceptance tests under the direct, day-to-day, supervision of an employee that is qualified (in accordance with Subsection 2.3) to conduct those tests. The maximum time period of supervised testing by any one non-qualified employee for each item is indicated in Subsection 2.4.2. Additional conditions that must be met are listed in Subsection 2.4.1. Note that these provisions do not apply to nuclear testing.
- 2.4.1 *Qualified Supervisor:* The qualified supervisor shall train the new employee, if needed, and then confirm in writing that this employee is capable of performing the tests in accordance with the standards. This written confirmation shall contain the following: identity and signature of the qualified supervisor, name and previous experience of the new employee, the time spent training the new employee, the tests for which the new employee is qualified, and the date the new employee will begin mix design or acceptance testing. The written confirmation shall be delivered to and approved by the Region Materials Engineer before the new employee performs mix design or acceptance tests. The qualified supervisor shall be present on the testing site at least once each day the new employee is conducting tests to closely oversee and check the work of the new employee. The qualified supervisor shall co-sign each test report and worksheet produced by the new employee. The close day-to-day supervision shall continue until the new employee is qualified by meeting the requirements of Subsection 2.3.
- 2.4.2 Time Limits for Acceptance Testing by Non-qualified New Employees:
- 2.4.2.1 *Soils Testing:* A maximum of 2 calendar months of continuous testing before qualification is required. Accumulation of time is not allowed.
- 2.4.2.2 *HMA Testing:* A maximum of two calendar months of continuous testing before qualification is required. Accumulation of time is not allowed. Inexperienced employees (less than one year of documented experience) performing testing on HMA shall successfully complete the *Asphalt Construction PC/OA Technician Education* course provided by the Rocky Mountain Asphalt Education Center (RMAEC) (303-741-6148) before seeking certification.
- 2.4.2.3 *Concrete Testing:* A maximum of six calendar months of continuous testing before qualification is required. Accumulation of time is not allowed.

### **3. LABORATORY QUALIFICATION PROGRAM**

- 3.1 The purpose of the Laboratory Qualification Program is to verify that laboratories conducting testing used in mix design or the acceptance decision are qualified. All laboratories conducting tests used in mix design or the acceptance decision must be qualified before construction of items requiring testing by that lab. Testing used in the acceptance decision includes verification testing by CDOT and designated agents of CDOT, plus PC testing by contractors and vendors.
- 3.2 All laboratories conducting testing used in mix design or the acceptance decision must meet the following requirements. CDOT and designated agent laboratories conducting verification testing, and contractors and vendors conducting PC testing used in the acceptance decision are included.

### 3.2.1 *Laboratory Inspections:*

- 3.2.1.1 *CDOT Laboratories:* The Region Materials Engineer or his designee shall conduct an inspection of each project laboratory before mix design or verification testing begins. The Central Laboratory may conduct random Field Laboratory inspections during project construction. The inspection shall be documented using the current *Field Lab & Personnel Qualification Checklist* and any supplemental lists deemed necessary. The Region Materials Engineer, his designee, or the Central Laboratory Inspection Coordinator shall indicate on the checklist whether or not the laboratory is qualified. If the laboratory has been determined to not be qualified, the deficiencies will be corrected to the satisfaction of the Region Materials Engineer. Project construction involving items subject to mix design or verification testing shall not begin until the laboratory conducting these tests is determined to be qualified. The Resident Engineer, in cooperation with the Region Materials Engineer, shall be responsible for assuring that CDOT owned project testing equipment is acceptable for mix design or verification sampling and testing.
- 3.2.1.2 *Designated Agent Laboratories:* All designated agent laboratories shall be part of the AASHTO Accreditation Program (AAP) or Cement and Concrete Reference Laboratory (CCRL) in all of the tests performed. The Region Materials Engineer shall conduct or direct a designated representative to conduct an inspection of each designated agent laboratory used in verification testing before testing begins. The Central Laboratory may conduct random Field Laboratory inspections during project construction. The inspection shall be documented using the current *Field Lab & Personnel Qualification Checklist* and any supplemental lists deemed necessary. The Region Materials Engineer, his designated representative, or the Central Laboratory Inspection Coordinator shall indicate on the checklist whether or not the laboratory is qualified. If the laboratory is determined to not be qualified, the deficiencies will be corrected to the satisfaction of the Region Materials Engineer. Project construction involving items subject to verification testing shall not begin until the laboratory conducting these tests is determined to be qualified. A designated agent may not conduct an inspection for qualification of its own laboratory. The laboratory shall participate in the CDOT round robin program for the required tests and achieve a score of 3.0 or better. Scores below a 3.0 will require approved corrective action and possible retesting.
- 3.2.1.3 *Contractor and Vendor Laboratories:* The Region Materials Engineer or his designated representative may conduct an inspection of each Contractor or vendor laboratory before PC testing used in the mix design or acceptance decision begins. If the inspection is performed it shall be documented using the current *Field Lab & Personnel Qualification Checklist* and any supplemental lists deemed necessary. The checklist shall indicate if the laboratory is qualified in all required tests. If the laboratory is determined to not be qualified, the deficiencies will be corrected to the satisfaction of the Region Materials Engineer. If the Contractor or vendor laboratory is used for mix design testing and is not AASHTO accredited, the laboratory shall participate in the CDOT round robin program for the required tests and achieve a score of 3.0 or better. Scores below a 3.0 will require approved corrective action and possible retesting. Testing conducted before the laboratory is determined to be qualified may not be used in the acceptance decision. Contractor or vendor laboratories used in PC-for-Pay projects shall be qualified in accordance with this subsection.

- 3.2.2 *Calibration Checks:* All laboratories performing mix design, verification testing, or PC testing used in acceptance shall conduct calibration checks at the minimum frequencies required by the test procedure, equipment operating guides, or Calibration Schedule included in the Field Materials Manual's Inspections (Central -> Region) Chapter. The results of these calibration checks shall be documented on the appropriate forms and retained for a period of seven years. The calibration check documentation shall be made available to the Region Materials Engineer or the Project Engineer upon request.
- 3.2.3 *Lab Personnel Qualifications:* All laboratories performing mix design, verification testing, or PC testing used in the acceptance decision shall maintain documentation of the qualification of all laboratory personnel. This documentation shall indicate that all laboratory personnel are qualified for all the tests they conduct. This documentation shall be current and available at all times for review by the Project Engineer and the Region Materials Engineer.
- 3.3 If the laboratory performing the mix design, verification testing, or PC used in the acceptance decision is AASHTO accredited in the tests performed, it may be exempted from the above requirements for inspection and calibration checks.

#### **4. INDEPENDENT ASSURANCE (IA) LABORATORY REQUIREMENTS**

- 4.1 The CDOT Central Laboratory, the Region Materials Laboratories, and designated agent laboratories conducting Independent Assurance (IA) inspections and testing shall conform to the following requirements.
- 4.1.1 *Central Lab and Designated Agents:* The CDOT Central Lab and designated agents conducting IA testing shall be AASHTO accredited in accordance with the requirements of Section 5.
- 4.1.2 *Region Materials Labs:* An inspection of each Region Materials Laboratory shall be made annually by personnel from the Central Materials Laboratory, as per Subsection 9.2.1.2 of the QA Procedures Chapter. Equipment Verification Checks will be made on equipment used for IA testing including ovens, scales, and balances.
- 4.1.3 All laboratories performing IA testing shall conduct equipment verification checks per AASHTO Accreditation Program (AAP) on all equipment used in IA testing during that period. The results of those checks shall be documented in accordance with AASHTO Accreditation Program on the appropriate forms and retained for a period of seven years.

#### **5. ACCREDITATION**

- 5.1 *CDOT Central Laboratory and Designated Agent Inspection:* The CDOT Central Lab and designated agents conducting IA testing for CDOT will be inspected periodically by the AASHTO Accreditation Program (AAP and/or CCRL) and will maintain accreditation by the AASHTO Accreditation Program.
- 5.1.1 The test procedures covered by the designated agent accreditation shall include all IA tests that the designated agent will conduct or observe for CDOT.
- 5.1.2 AASHTO Accreditation Program (AAP) and Cement and Concrete Reference Laboratory (CCRL) Inspection Reports:

- 5.1.2.1 All AAP and CCRL inspection reports from inspections conducted on the Central Materials Laboratory will be retained and made available to the FHWA upon request.
- 5.1.2.2 All AAP and CCRL inspection reports from inspections conducted on designated agents that conduct IA testing for CDOT will be retained and made available to CDOT upon request.
- 5.1.3 Deficiencies Identified in AAP or CCRL Inspection Reports:
  - 5.1.3.1 Deficiencies indicated in the AAP or CCRL inspection reports for inspections conducted on the CDOT Central Materials Laboratory or on designated agents conducting IA testing for CDOT will be corrected at the earliest opportunity and documentation of the corrective action sent to AAP or CCRL.
- 5.1.4 Proficiency Samples Ratings:
  - 5.1.4.1 CDOT Central Laboratory or designated agent laboratory AASHTO Proficiency Samples with a rating of less than 3 (2 Standard Deviations) will be investigated to determine the cause of the low ratings and corrective action taken to prevent future occurrences. These corrections will be reported, in writing, to AAP or CCRL within 60 days of the receipt of the deficient rating.
- 5.2 Local Agencies shall have IA inspections conducted by an AASHTO-accredited laboratory in accordance with the conditions of Subsection 7.4 of the Quality Assurance Procedures Chapter of the Field Material Manual (FMM). The local agency must confirm that the Accredited Laboratory meets all appropriate criteria.

## **6. INSTRUCTIONS FOR USE OF THE – FIELD LAB & PERSONNEL QUALIFICATION CHECKLIST GENERAL**

- 6.1 Lab Cleanliness & Housekeeping - The field-testing lab is generally clean and organized to the point where it will not affect test results.
- 6.2 Equipment Cleanliness & Functionality - The field-testing equipment is clean and in good working order, with no broken or partially repaired parts that would have a detrimental effect on the test results.
- 6.3 Calibration Checks & Personnel Qualification - Documentation of the calibration checks must be readily available in the field-testing lab, being both complete and up-to-date. This includes calibration checks of scales, ovens, water baths (concrete & bulk), and thermometers. Equipment verification such as sieve examinations, measurements of air meters, slump cones, cylinder molds, beam molds, etc. should also be documented. The qualifications of each person in the lab who conduct the tests are documented, being both current and available.
- 6.4 Scales, Accurate & Level - Verify scales have been checked with a reference weight in accordance with AASHTO M 231 and are level on the testing face.
- 6.5 Ovens, Accurate Temperatures (140°, 230°, 275°, & 300°F) - Verify that oven thermostats are maintaining the temperature of the 140°F ± 5° (60°C ± 2.8°) oven, 230°F ± 9° (110°C ± 5°) oven, 275°F ± 5° (135°C ± 2.8°) oven, and the 300°F ± 5° (149°C ± 2.8°) oven.

- 6.6 Thermometer(s) Accurate - Conforming to the requirements of ASTM. The thermometers shall be capable of reading 77°F by 0.2°F (25°C by 0.1°C), 140°F by 0.2°F (60°C by 0.1°C), 230°F by 1°F (110°C by 0.5°C), 275°F by 2°F (135°C by 1°C), and 300°F by 2°F (149°C by 1°C).
- 6.7 Sieves - In good condition, and checked with comparator. Sieves conform to ASTM E 11 and have been checked with a certified comparator in accordance with ASTM E 11. Verify that there are no visible holes, dents, wire marks, etc. in the sieves or any sagging of the sieve.
- 6.8 Current and Updated CDOT Materials Forms. CDOT Owner Acceptance Sampling Checklist (SM Report 250) and Final Materials Documentation and Checklist, IA Summary Report (SM Report 473) are filled out and complete as of the date of the inspection.
- 6.9 Equipment and Lab Facility supplied by the Contractor meet the M Standards (M-620-11 or M-620-12) or the specification for the project for which the lab is being supplied. If the Contractor has proposed establishing a project field laboratory within a fixed building, the Contractor shall first provide a proposed floor plan layout of the laboratory space to the Project Engineer and Region Materials Engineer for review and approval. The proposed lab space shall be at least the same overall size, have roughly the same dimensions, and have the same general layout and useable work space as the specified laboratory space as shown in the M Standards. If the plan layout is approved by the Project Engineer and the Region Materials Engineer, but the building space requires modification in order to accommodate the proposed lab space, the Contractor shall obtain all required building permits and pass all inspections required for the modifications. Modifications may include, but are not limited to; removal, modification to, or construction of walls, changes to electrical wiring / loading, changes to plumbing, including drains, venting for ovens, providing for nuclear gauge storage / isolation, etc.
- 6.10 Aggregate splitter complies with ASTM C 702 for the correct number of opening and the size of openings. Splitter does not have visible signs of excessive wear, i.e., splitter openings broken, dented, welds detached, etc.
- 6.11 Shaker - Sieving Adequacy Test Performed. Verify the correct aggregate sieving time by running the sieving adequacy test defined in CP 31, ASTM C 136, and AASHTO T 27. Verify that the sieve shaker can hold an entire set of sieves, (10 + catch pan).

#### **CONCRETE**

- 6.12 Curing tanks for concrete cylinders and beams contains lime-water at the correct temperature, 73.5°F ± 3.5° in accordance with ASTM C 31. Verify the recording thermometer is present and is correct in accordance with ASTM C 31.
- 6.13 Verify that all Concrete Testing Equipment meets the appropriate requirements: Air meter (ASTM C 231), Slump Cone (ASTM C 143), Unit Weight (ASTM C 138), Cylinder Molds (ASTM C 31), and Beam Molds (ASTM C 78).

- 6.14 Verify that the Concrete Compression Machine has been calibrated for concrete cylinders, ASTM C 39, and for beams (if tested), ASTM C 78, and has a current (yearly) certified calibration sticker on the machine. Verify that the neoprene pads meet ASTM C 1231 and have been checked for wear and logged for the number of breaks on each pair of pads (maximum of 100 uses per pad). Verify the loading rate of the Concrete Compression Machine and that it meets the ASTM C 39. Verify that calibration records for the Concrete Compression Machine are available and up to date in accordance with ASTM E 4.

**Note 1:** ACI Aggregate Base Testing Technician was added into Table 10-1 and the Field Lab & Personnel Qualification Checklist.

**Note 2:** AASHTO TP118 Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method (Super Air Meter), was added into Table 10-1 and the Field Lab & Personnel Qualification Checklist.

\*\* Those testing self-consolidating concrete shall have the SCC certification in addition to the FG certification.

### ASPHALT

- 6.15 Verify that a square splitting pan and square sided scoop are being used for asphalt sampling and splitting in accordance with CP 55.
- 6.16 Verify that CP 51 is being followed for determination of Maximum Specific Gravity (Rice). Verify that manometer is free of air bubbles, vacuum pump oil is free of water, desiccating crystals are free of moisture, flasks have been calibrated in accordance with CP 51 and "D" weights have been logged. Verify that vacuum pump pressure can be maintained at  $28 \pm 2$  mm of mercury.
- 6.17 Verify that CP 44 is being followed for determination of Bulk Specific Gravity. Bulk tank is at the correct temperature,  $77^{\circ}\text{F} \pm 1.8^{\circ}$  ( $25^{\circ}\text{C} \pm 1^{\circ}$ ). Suspension line is of the smallest possible diameter at the water surface (and there are no knots in the suspension line at the surface).

### NUCLEAR

- 6.18 Verify that nuclear gauges are stored and secured properly as required by the Radioactive Materials License. Verify that the Caution Radioactive Materials placard, the Notice to Employees document, and the Nuclear Incident Procedure sheet (filled out with responsible individual(s) names and phone numbers) are posted correctly. That the daily gauge logs are filled out and current, and the Moisture / Density Gauge has been calibrated as specified. Consultant M/D Gauges have been certified within the last 12 months and CDOT M/D Gauges have been calibrated within the last 24 months. Verify that Statistical Stability and Drift tests have been run before the start of the project and whenever requested by the Project Engineer.

### SOILS

- 6.19 Verify that soils and base course equipment meet the corresponding AASHTO requirements and that the correct hammers and molds, designated in AASHTO T 99 and T 180, are used. Verify that the atterberg limit equipment is calibrated properly and is within specification in accordance with AASHTO T 89 and T 99. Verify that the #4 riddle meets the AASHTO E 11 standards by using a comparator, micrometer, or other calibrated measuring device. Verify that the compaction base is of sufficient mass ( $> 90$  kg) and that a suitable area for compaction is available in accordance with AASHTO T 99 and T 180.

AASTHO Test Designation	ASTM Test Designation	CDOT Test Designation	Test Description	ACI Concrete Field Testing Technician Grade I (FG) - Self-Consolidating Concrete Testing Technician (SCC)	ACI Aggregate Testing Technician - Level 1 (1) - Level 2 (2)	ACI Concrete Lab. Testing Tech. Grade I (G) - Level 1 (1) - Both (B)	ACI Concrete Lab. Testing Tech. Grade II (G) - Level 2 (1) - Both (B)	ACI Concrete Strength Testing Technician	ACI Agg. Base Testing Technician	WAQTC Embankment & Base Excavation & Embankment – Soils Inspector	LABCAT Level A	LABCAT Level B	LABCAT Level C	LABCAT Level E	SiteManager Materials (SMM) /LIMS)
T 2	D 75	CP 30	Sampling Aggregates		1	B			X		X			X	
T 84	C 128	CPL 4102	Specific Gravity and Absorption of Fine Aggregate		1	B								X	
T 85	C 127		Specific Gravity and Absorption of Coarse Aggregate		1	B			X					X	
T 11	C 117	CP 31	Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing		1	B						X			
T 248	C 702	CP 32	Reducing Samples of Aggregate to Testing Size		1	B			X			X			
T 255	C 566		Total Moisture Content of Aggregate by Drying		1	B				X					
T 27	C 136	CP 31	Sieve Analysis of Fine and Coarse Aggregates		1	B						X			
T 112	C 142		Clay Lumps and Friable Particles in Aggregate		2		G							X	
T 96	C 131		Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine		2		G							X	
	C 535		Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine		2		G								
T 176		CP 37	Plastic fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test		2									X	
T 304			Un-compacted Void Content of Fine Aggregate		2									X	
TP 61	D 5821	CP 45	Determining the Percentage of Fractured Particles in Coarse Aggregate		1 or 2									X	
T 104			Soundness of Aggregates by Freezing and Thawing		2									X	
	D 4791		Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate		2									X	
T 327			Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus											X	
T 166		CP 44	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens									X			
T209		CP 51	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures									X			



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		CP 81	In-Place Density of Bituminous Mixes Using the Nuclear Moisture-Density Gauge								X				
	D 3665	CP 75	Random sampling								X				
T168		CP 41	Sampling Hot Mix Asphalt								X				
T248		CP 55	Splitting Hot Mix Asphalt								X				
T287		CP 85	Asphalt Content by Nuclear Method									X			
T308		CPL 5120	Asphalt Content by Ignition Method									X			
T312			Superpave Gyrotory Compactor										X		
T246		CPL 5106	Hveem Stability										X		
T283		CPL 5109	Resistance to Moisture Induced Damage										X		
	C 1231		Unbonded Caps for Concrete Cylinders			B		X							
	C 39		Compressive Strength of Cylindrical Concrete Specimens			B		X							
	C 617		Capping Cylindrical Concrete Specimens			B		X							
	C 1064		Temperature of Freshly Mixed Hydraulic-Cement Concrete	FG											
	C 172		Sampling Freshly Mixed Concrete	FG											
	C 143		Slump of Hydraulic-Cement Concrete	FG											
	C 138		Density, Yield and Air Content (Gravimetric) of Concrete	FG**											
	C 231		Air Content of Freshly Mixed Concrete by Pressure Method	FG**											
	C 31		Making and Curing Concrete Test Specimens in the Field	FG**											
	C 42		Obtaining and Testing Drilled Cores and Sawed Beams				B								
	C 78		Flexural Strength of Concrete (Using Simple Method with Third-Point Loading)			L	G	X							
T310		CP 80	In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)							X					
T 89			Determining the Liquid Limits of Soils						X	X *					
T 90			Determining the Plastic Limit and Plasticity Index of Soils						X	X *					
T 99 T180		CP-23	Moisture Density Relations of Soils						X	X					

ASTHO Test Designation	ASTM Test Designation	CDOT Test Designation	Test Description	ACI Concrete Field Testing Technician Grade I (FG) - Self-Consolidating Concrete Testing Technician (SCC)	ACI Aggregate Testing Technician - Level 1 (1) - Level 2 (2)	ACI Concrete Lab. Testing Tech. Grade I (G) - Level 1 (1) - Both (B)	ACI Concrete Lab. Testing Tech. Grade II (G) - Level 2 (1) - Both (B)	ACI Concrete Strength Testing Technician	ACI Agg. Base Testing Technician	WAQTC Embankment & Base Excavation & Embankment – Soils Inspector	LABCAT Level A	LABCAT Level B	LABCAT Level C	LABCAT Level E	SiteManager Materials (SMM) /LIMS)
	C 1610		Static Segregation of Self-Consolidating Concrete Using Column Technique	SSC											
	C 1611		Slump Flow of Self-Consolidating Concrete	SCC											
	C 1621		Passing Ability of Self-Consolidating Concrete by J-Ring	SCC											
	C 1712		Rapid Assessment of Static Segregation Resistance of Self-Consolidating Concrete Using Penetration Test	SCC											
	C 1758		Fabricating Test Specimens with Self-Consolidating Concrete	SCC											
TP 118			Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method (Super Air Meter)	FG											
T198	C 496		Split Tensile Strength Testing		2										
		TETP	CDOT Materials Technician Training Course												X

**TABLE 10-1 Sampling & Testing Personnel Qualifications<sup>1</sup>**

\* Those only seeking an inspection certification need only pass the excavation and embankment exam.

\*\* Those testing self-consolidating concrete shall have the SCC certification in addition to the FG certification

<sup>1</sup> **New for projects utilizing the 2020 Field Materials Manual and advertised after January 1, 2020** - All personnel conducting Owner Acceptance Testing and acceptance of materials on CDOT projects advertised after January 1, 2020, shall have successfully completed and passed the online e-learning CDOT Materials Technician Training Course offered through the CDOT Transportation Engineering Training Program (TETP). This online course can be accessed at the following link: <https://www.codot.gov/programs/tetp>. This is in addition to qualifications/certifications required for specific materials or test methods as listed in Table 10-1, above.

## What you need to know about CDOT Materials Technician Certification

Welcome to the CDOT Materials Technician Certification course.

As of January 1, 2020, all Materials Technicians conducting Field Quality Assurance testing on CDOT projects must complete this training and become certified. This applies to both CDOT internal staff and consultant staff.



As a Quality Assurance Materials Technician on a CDOT project, it is critical that you have not only the technical skills required for sampling and testing, but that you also understand what is expected of you in terms of CDOT processes, where to find information, communication protocols, and documentation requirements.



### How the Course Works

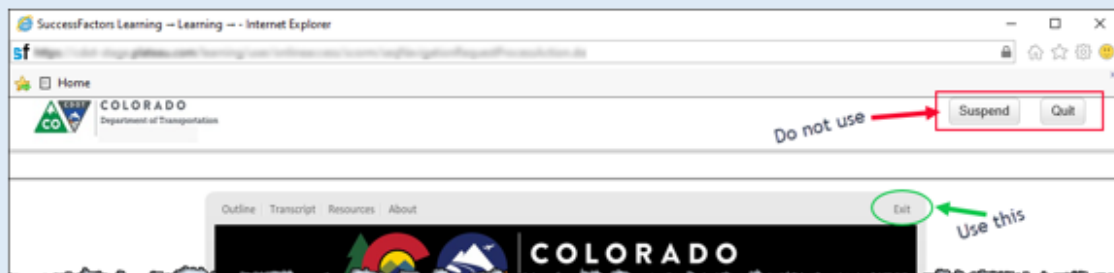
This course is designed to be challenging! Read everything, answer the questions, and refer to the documentation and references linked in the course. You will need all of the information in order to pass the post-course assessment. Remember:

- The course, including the post-course assessment, should take approximately **3½ hours** to complete. You can exit the course and come back to it later if you need to.
- You must pass the post-course assessment with a **score of 70%** or higher.
- You have **three tries** to pass the assessment.
- If you do not pass, you will **not receive your certification** and **will not be able to take the course again** without additional training.



### Tips and Tricks for Success

- If you see “extra” buttons at the top of your training screen, **do NOT use them to exit the course.** Your progress will not be saved and you may not get credit for the training. Use the “Exit” tab at the top right of the course window.



- **Do not take the assessment until you are ready**
- **Review all resources and links** (you may want to keep them open on your desktop)
- Remember that you only get three tries at the assessment; **review carefully.** Ask for **help from your supervisor** or trainer before your third try
- Once you've passed the course, you can go back and review at any time



### Your Tools

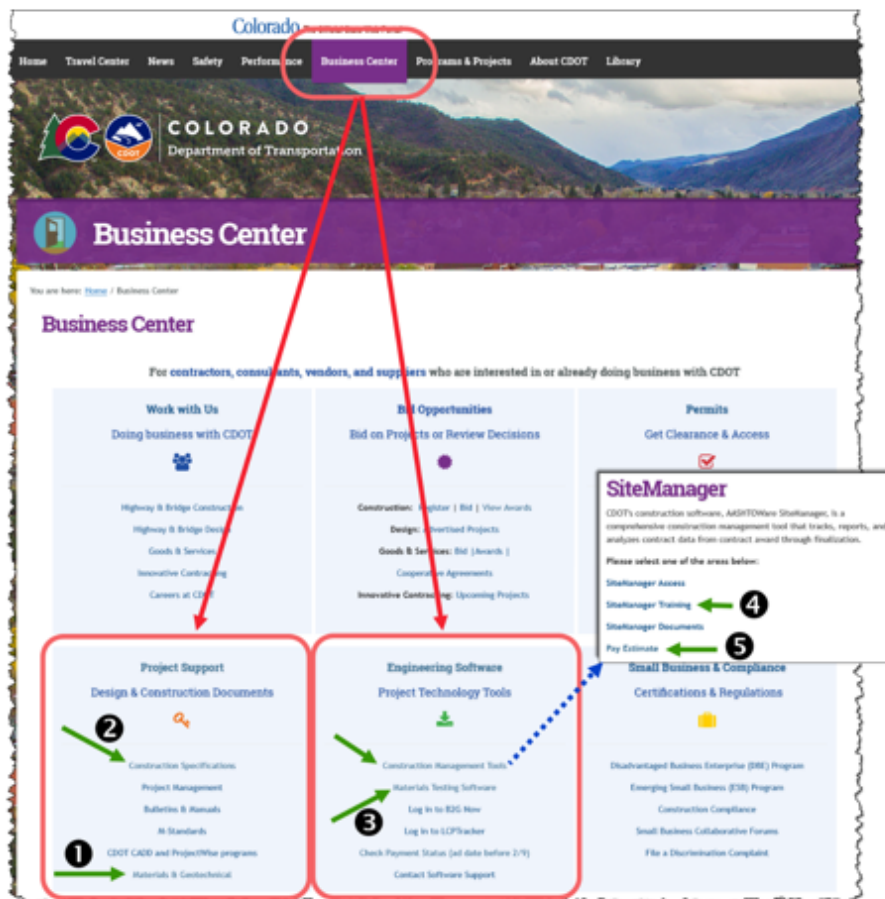
The resources below are linked to and used throughout this course. You may want to become familiar with how to access and use them before you start the course.

CDOT website	<a href="https://www.codot.gov/">https://www.codot.gov/</a>
CDOT Standard Specifications for Road & Bridge Construction 2017	<a href="https://www.codot.gov/business/designsupport/cdot-construction-specifications/2017-construction-standard-specs/2017-specs-book/division-100-2017-final.pdf/view">https://www.codot.gov/business/designsupport/cdot-construction-specifications/2017-construction-standard-specs/2017-specs-book/division-100-2017-final.pdf/view</a>
CDOT Field Materials Manual 2019	<a href="https://www.codot.gov/business/designsupport/matgeo/manuals/2019-fmm/intro-docs/%2803%29%20Documentation%20for%20SMM_LIMS-19/view">https://www.codot.gov/business/designsupport/matgeo/manuals/2019-fmm/intro-docs/%2803%29%20Documentation%20for%20SMM_LIMS-19/view</a>
SiteManager Training	<a href="https://sites.google.com/a/state.co.us/sitemanager-materials/image-heavy-page">https://sites.google.com/a/state.co.us/sitemanager-materials/image-heavy-page</a>
Project Pay Estimates	<a href="https://www.codot.gov/business/engineeringapplications/project-construction/aashtoware-project-construction-sitemanager-pay-estimates#gsc.tab=0">https://www.codot.gov/business/engineeringapplications/project-construction/aashtoware-project-construction-sitemanager-pay-estimates#gsc.tab=0</a>

### Navigating the CDOT Website

Many of the resources and information you need for this course and on the job can also be found by navigating through the Business Center section of the CDOT website.

- 1 CDOT Field Materials Manual—Business Center>Project Support: Materials & Geotechnical
- 2 CDOT Standard Specifications—Business Center>Project Support: Construction Specifications
- 3 SiteManager information—Business Center>Engineering Software: Materials Testing Software
- 4 SiteManager training—Business Center>Engineering Software: Construction Management Tools: SiteManager Training
- 5 Pay estimates—Business Center>Engineering Software: Construction Management Tools: Pay Estimate





### Field Lab & Personnel Qualification Checklist – 2020

Project No: \_\_\_\_\_ Contract ID \_\_\_\_\_

Project Location: \_\_\_\_\_

Consultant / Field Tester \_\_\_\_\_ Project Engineer \_\_\_\_\_

Qualified Laboratory?  Yes  No

General Impression:

Current LIMS Access?  Yes  No

Region Inspection of Project Field Lab

Region Inspection of Contractor Lab

Region Inspection of Consultant Lab

#### GENERAL

- 6.1 Lab Cleanliness & Housekeeping.....
- 6.2 Equipment Cleanliness & Functionality.....
- 6.3 Calibration Checks & Personnel Qualification, Documents present & complete.....
- 6.4 Scales - Accurate & Level.....
- 6.5 Ovens-Verified as Accurate, Temperatures (140°, 230°, 275°, 300°F).....
- 6.6 Thermometer(s)-Accurate.....
- 6.7 Sieves - Good repair, and checked w/ comparator.....
- 6.8 Current CDOT Materials Forms.....
- 6.8 Forms up-to-date (# 250 & # 379, and all others).....
- 6.9 Equipment & Lab facility supplied by Contractor meet Specifications.....
- 6.10 Aggregate Splitter - Correct # of openings.....
- 6.10 Correct size openings.....
- 6.11 Shaker-sieving adequacy performed.....
- 6.11 Holds full set of sieves (10 + catch pan).....

Comments:

- CONCRETE    Applicable.....
- 6.12    Concrete curing water at correct temperature.....
- Recording thermometer present and operating.....
- 6.13    Concrete Testing Equipment.....
- Air Meter Calibrated.....
- Slump Cone Dimensions are accurate.....
- Strike off plate for Unit Wts is accurate.....
- Approved Cylinder/Beam Molds.....
- 6.14    Concrete Compression Machine.....
- Calibrated for Cylinders/Beams.....
- Neoprene Pads checked/logged.....
- Correct Loading Rate.....
- Calibration records present.....

Comments:

- ASPHALT    Applicable.....
- 6.15    Square Splitting Pan for Asphalt.....
- Square Sided Scoop for Asphalt.....
- 6.16    Maximum Specific Gravity (RICE) set up.....
- Manometer free of air.....
- Pump oil free of water.....
- Desiccating crystals free of water.....
- Flasks calibrated and logged.....
- Vacuum Pump Pressure at  $28 \pm 2$  mm Hg.....
- 6.17    Bulk Specific Gravity Equipment.....
- Tank at Correct Temperature.....
- Suspension line of smallest diameter.....

Comments:

<b>NUCLEAR</b>	Applicable.....	<input type="checkbox"/>
6.18	Nuclear Gauge Stored Properly & Secured.....	<input type="checkbox"/>
	Caution Radioactive Materials placard posted correctly.....	<input type="checkbox"/>
	Nuclear Incident Procedures filled out.....	<input type="checkbox"/>
	Daily Gauge Logs filled out.....	<input type="checkbox"/>
	M/D Gauge Certified.....	<input type="checkbox"/>
	Stat & Drift Test performed.....	<input type="checkbox"/>

Comments:

<b>SOILS</b>	Applicable.....	<input type="checkbox"/>
6.19	Soils & Base Equipment.....	<input type="checkbox"/>
	Hammers & Molds within specification.....	<input type="checkbox"/>
	Atterberg equipment within specification.....	<input type="checkbox"/>
	#4 Riddle within specification.....	<input type="checkbox"/>
	Compaction base of sufficient mass (>90 Kg).....	<input type="checkbox"/>

Comments:

Additional Comments:


PERSONNEL


Tester 1 (Name / Title)	Required (Y or N)	Certification	Expiration MM-DD-YY
	<input type="checkbox"/>	CDOT Materials Technician Certification TETP	*No Expiration Date
	<input type="checkbox"/>	ACI Concrete Field Testing Technician Grade I	
	<input type="checkbox"/>	ACI Aggregate Testing Technician – Level 1	
Comments:	<input type="checkbox"/>	ACI Aggregate Testing Technician – Level 2	
	<input type="checkbox"/>	ACI Concrete Laboratory Testing Technician Grade I or ACI Concrete Lab. Testing Tech. Level 1	
	<input type="checkbox"/>	ACI Concrete Laboratory Testing Technician Grade II or ACI Concrete Lab. Testing Tech. Level 2	
	<input type="checkbox"/>	ACI Concrete Strength Testing Technician	
	<input type="checkbox"/>	ACI Aggregate Base Testing Technician	
	<input type="checkbox"/>	WAQTC Embankment & Base Excavation & Embankment – Soils Inspector	
	<input type="checkbox"/>	LabCAT A	
	<input type="checkbox"/>	LabCAT B	
	<input type="checkbox"/>	LabCAT C	
	<input type="checkbox"/>	LabCAT E	

Tester 2 (Name / Title)	Required (Y or N)	Certification	Expiration MM-DD-YY
	<input type="checkbox"/>	CDOT Materials Technician Certification TETP	*No Expiration Date
	<input type="checkbox"/>	ACI Concrete Field Testing Technician Grade I	
	<input type="checkbox"/>	ACI Aggregate Testing Technician – Level 1	
Comment:	<input type="checkbox"/>	ACI Aggregate Testing Technician – Level 2	
	<input type="checkbox"/>	ACI Concrete Laboratory Testing Technician Grade I or ACI Concrete Lab. Testing Tech. Level 1	
	<input type="checkbox"/>	ACI Concrete Laboratory Testing Technician Grade II or ACI Concrete Lab. Testing Tech. Level 2	
	<input type="checkbox"/>	ACI Concrete Strength Testing Technician	
	<input type="checkbox"/>	ACI Aggregate Base Testing Technician	
	<input type="checkbox"/>	WAQTC Embankment & Base Excavation & Embankment – Soils Inspector	
	<input type="checkbox"/>	LabCAT A	
	<input type="checkbox"/>	LabCAT B	
	<input type="checkbox"/>	LabCAT C	
	<input type="checkbox"/>	LabCAT E	



Inspected by: \_\_\_\_\_ Date: \_\_\_\_\_ Region Materials Lab: \_\_\_\_\_  
(print name)

Inspected by  \_\_\_\_\_  
(Signature)

Approved by:  \_\_\_\_\_ Date: \_\_\_\_\_  
Project Engineer (print name)

- Distribution:
- Region Materials Engineer- Original
  - Resident Engineer
  - Project Engineer
  - Field Lab Tester

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