

## Inspections: CDOT Central Laboratory of the Regions - 19

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### PROTOCOL FOR OPEN LABORATORY REVIEW OF A CDOT MATERIALS TESTING LABORATORY

**PURPOSE:** To provide an established protocol for the review and observation by non-CDOT personnel of CDOT Laboratory techniques and procedures, and to foster a resolution of materials issues on CDOT projects.

<b>Recommended Time to complete</b>	<b>Action</b>
	<u>CDOT Project Engineer and Prime Contractor initiate Request</u>
↑ 1 week ↓	<u>Pre-Lab Visit Meeting</u> <b>Attendees:</b> RME and/or Central Laboratory Program Manager, Lab Manager, CDOT PE, Prime Contractor, HMA supplier, third party <b>Discussion:</b> Goals, specific tests, applicable specifications, existing documentation (calculations, worksheets, QC, QA, IAT), procedures for lab review and QAP documentation. Establish detailed scope for laboratory visits.
↑ Same day ↓	<u>Lab Visit</u> <b>Attendees:</b> 2 supplier representatives <b>Logistics:</b> Specific date, time, duration, and adhere to established laboratory visit scope.
↓ 1 week ↓	<u>Post Lab Meeting</u> <b>Attendees:</b> RME, Lab Manager, 2 supplier representatives
	<u>Written Report</u>

## Protocol for the Inspection of Region Materials Laboratories by the Central Materials Laboratory - 15

**AUTHORITY:** The Code of Federal Regulations (CFR) requires that for all State DOTs the Central Laboratories be AASHTO accredited and all laboratories conducting acceptance tests must be qualified. CDOT implements this requirement by having the Central Laboratory inspect Region Materials Laboratories, and by having Region laboratories inspect project (Field) laboratories. The Central Laboratory may also inspect project (Field) labs. This program is documented in the QA Procedures Chapter, Subsection 9.2.1.2, in the Field Materials Manual, which is reviewed and approved by the FHWA.

**OVERVIEW:** Each year a team from the Central Laboratory inspects each Region Materials Laboratory. Checklists are filled out during these inspections recording equipment condition, calibration, serial number, etc. A report is written documenting the results of the inspection. Checklists are included as attachments to the Final Report

**TEAM MEMBERSHIP:** The Concrete & Physical Properties Program will lead the inspection team. The team will be comprised of personnel from the Asphalt Pavement, Soils, and Concrete / Physical Properties programs. The Program Manager may delegate leadership to a PE I or Scientist II or higher within that Program. Experienced technicians from each Program are also on the team. The Team Leader and the other Program Managers will agree on the selection of technicians for the team.

**SCHEDULING INSPECTIONS:** The Team Leader schedules the inspections with the Regions at mutually convenient times and dates. Mobile Lab Trailers will not be inspected if they have been removed from active service. These trailers will be inspected after they are returned to service.

**INSPECTION CHECKLISTS:** Each of the three Programs is responsible for developing and maintaining worksheets that associate with the CDOT Form #520 to assist in and document the inspection.

**CONDUCT OF INSPECTIONS:** The team inspects the laboratory equipment and may observe the conduct of tests using appropriate checklists. Any equipment, which is not properly calibrated, correlated, does not meet applicable standards, or is not in good working condition, is noted. Each technician focuses on equipment appropriate to their specialty area. General use equipment such as balances and ovens are also checked.

**REPORTING OF INSPECTION RESULTS:** The Team Leader will write the reports documenting the results of the Region's inspection. The report lists non-conformities in equipment and procedures, recommends any action needed to address problems or non-conformities, and reports the latest round robin results. Draft reports will be distributed to the Region Materials Engineers for comments prior to distribution. Each Final Report, with the attachments, is then distributed. The Reports will be distributed by June 30<sup>th</sup>.

Region Materials Engineers will submit a written response to the Central Laboratory Branch Manager within one month of receiving the lab inspection report. Round robin testing must be performed and scores of 2, 1, or 0 must be addressed. The procedures that each individual lab within the Region is qualified to perform will be listed on the MAC website under Lab Accreditations.

**DISTRIBUTION LIST:**

RTD - Direct Recipient  
Director of Project Support  
Region Materials Engineer  
FHWA  
Chief Engineer  
Central Laboratory - Documentation Unit

**Colorado Department of Transportation**  
**Report of Central Laboratory to Region Lab Inspection**

This inspection is designed to cover apparatus and documentation used in CDOT Region Laboratories. Equipment was inspected according to applicable CDOT, ASTM and AASHTO specifications.

Region	Location	Date
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Region personnel present during inspection	Central Laboratory personnel present during inspection

General Lab	Rating
1. Lab cleanliness & housekeeping? (Good/Fair/Poor)	
2. Equipment cleanliness & functionality? (Good/Fair/Poor)	
3. Region Quality System Manual present, current & complete? (Y/N)	
4. Tester Certifications present and complete? (Y/N)	
5. Current CDOT Field Materials Manual, Laboratory Manual of Test Procedure & CDOT Forms? (Y/N)	

**Comments**

General Lab Equipment		Applicable	Passed
Procedure	Description	(Y/N)	(Y/N)
A-1	Sieve Check		
A-2	Sieving Adequacy Check		
G-1	Verification of Balance		
G-2	Standardization of Oven Temperature		
G-3	Calibrated Thermometer Check		
G-4	Standardization of Liquid-in-Glass / Digital Thermometers		

**Comments**

<b>Asphalt Laboratory Equipment</b>		Applicable	Passed
Procedure	Description	(Y/N)	(Y/N)
HMA-1	Standardization of Low Temperature Oven or Freezer		
HMA-2	Superpave Gyratory Compactor Mold Check		
HMA-3	Superpave Gyratory Compactor Ram Head Check		
HMA-4	Troxler Gyratory Compactor True Mold Angle Check		
HMA-5	Troxler Gyratory Compactor Pressure Check		
HMA-7	Troxler Gyratory Compactor Height Calibration and Rotation Check		
HMA-8	Vacuum System Check		
HMA-9	Standardization of Water Baths		
HMA-10	Stabilometer Check		
HMA-11	United Press Load Cell Check		
<b>Comments</b>			

<b>Concrete Laboratory Equipment</b>		Applicable	Passed
Procedure	Description	(Y/N)	(Y/N)
C-1	Type B Air Meter Check		
C-2	Flexural Strength Apparatus Check		
C-3	Sulfur Mortar Check		
C-4	Capping Plate Check		
C-5	Compression Machine Check		
C-6	Mortar Cube Bearing Block Check		
C-7	Concrete Hand Tools Check		
C-8	Neoprene Pad Check		
C-9	Volumetric Air Meter Check		
C-10	Slump Cone Check		
C-11	Splitting Tensile Apparatus Check		
C-12	Strike-Off Plate Check		
C-13	Cube Mold And Tamper Check		
C-14	Beam Mold Check		
C-15	Moist Room Check		
C-16	Water Storage Tank Check		
C-17	Cylinder Mold Evaluation		
<b>Comments</b>			

<b>Soils Laboratory Equipment</b>		Applicable	Passed
Procedure	Description	(Y/N)	(Y/N)
S-1	Liquid Limit Equipment Check		
S-2	Compaction Mold Check		
S-3	Compaction Rammer Check		
S-4	Straightedge Check		
S-5	R-Value Mold Check		
S-6	Fine Aggregate Splitter Check		
S-7	Coarse Aggregate Splitter Check		
S-8	Metal Follower & Standard Metal Specimen Check		
S-9	Rubber Disk and Filter Paper Check		
N/A	Sulfate Test Equipment		
N/A	Chloride Test Equipment		
N/A	pH test Equipment		
N/A	Soil Resistivity Equipment		
N/A	Nuclear M/D Gauges Calibrated		
<b>Comments</b>			

<b>Physical Properties Laboratory Equipment</b>		Applicable	Passed
Procedure	Description	(Y/N)	(Y/N)
PP-1	Fine Aggregate Angularity Equipment Check		
PP-2	Coarse Aggregate Specific Gravity Equipment Check		
PP-3	Fine Aggregate Specific Gravity Equipment Check		
PP-4	Micro Deval Equipment Check		
PP-5	LA Abrasion Equipment Check		
PP-6	Sand Equivalent Equipment Check		
<b>Comments</b>			

Distribution:

- Materials and Geotechnical Branch Manager
- Materials and Geotechnical Program Managers
- Region Materials Engineer

<b>Equipment Calibration, Verification, and Check Information</b>			
<i>Testing Area</i>	<i>Items(s)</i>	<i>Calibration/Verification Interval</i>	<i>Calibration/Verification Procedure</i>
General	Balances, Scales and Weights	12 Mo.	Certified Contractor or G-1
General	Test Thermometers	12 Mo.	Certified Contractor or G-3 & G-4
General	Sieves	12 Mo.	A-1
General	Mechanical Shakers	12 Mo.	A-2
General	Oven	12 Mo.	G-2
Concrete/PP Unit	Air Meters	3 Mo.	ASTM C 231
Concrete/PP Unit	Capping Material	3 Mo.	AASHTO T 231
Concrete/PP Unit	Compression Testing Machine	12 Mo.	Certified Contractor ASTM C 39
Concrete/PP Unit	Beam Apparatus	12 Mo.	Certified Contractor AASHTO T 97
Concrete/PP Unit	Conical Mold & Tamper	24 Mo.	ASTM C 128
Concrete/PP Unit	Single Use Molds	Once per shipment.	AASHTO M 205
Concrete/PP Unit	Beam Molds	12 Mo	AASHTO T 23
Concrete/PP Unit	L.A. Machine	24 Mo.	AASHTO T 96
Concrete/PP Unit	Moist Room	Verify Temp with Recording Thermometer	ASTM C 511
Concrete/PP Unit	Slump Cones	12 Mo.	ASTM C 143
Concrete/PP Unit	Steel Balls	24 Mo.	AASHTO T 96
Concrete/PP Unit	Unit Weight Measures	12 Mo.	ASTM C 29
Concrete/PP Unit	Unbonded Caps	Each Shipment	ASTM C 1231
Concrete/PP Unit	M/D Gauge, Calibration Checks	12 Mo.	CP-L 5303
Flex. Pvmt	Compression Testing Machine	12 Mo.	Certified Contractor or HMA-11
Flex. Pvmt	Molds, Superpave	12 Mo.	HMA-2
Flex. Pvmt	Superpave Gyratory Compactor, Verify Ram Pressure, Angle of Gyration, Frequency of Gyration, LVDT	12 Mo.	HMA-4, 5, 7
Flex. Pvmt	Superpave Gyratory Compactor, Verify Ram Head and Base Plate	12 Mo.	HMA-2 & 3
Flex. Pvmt	Superpave Gyratory Compactor Calibration Load Cell	12 Mo.	Certified Contractor
Flex Pvmt	Water Bath	12 Mo	HMA-9
Flex. Pvmt	Vacuum System	12 Mo.	HMA-8
Flex. Pvmt	Molds, Followers, Calibration Cylinders	12 Mo.	HMA-10
Flex. Pvmt	Ignition Oven Internal Scale	12 Mo.	Certified Contractor or G-1
Flex. Pvmt	Vacuum / Pressure Measuring Gauges	12 Mo.	Certified Contractor or HMA-8
Soils Unit	California Kneading Compactor	12 Mo.	Certified Contractor
Soils Unit	Compression or Loading Device	12 Mo.	Certified Contractor
Soils Unit	Grooving Tool	12 Mo.	AASHTO T 89
Soils Unit	Hydrometers	24 Mo.	AASHTO T 88
Soils Unit	Liquid Limit Device	12 Mo.	AASHTO T 89
Soils Unit	Manual Hammer	12 Mo.	AASHTO T 99 / AASHTO T 180
Soils Unit	Mechanical Compactor (Hammer)	12 Mo	AASHTO T 99/ AASHTO T 180
Soils Unit	Metal Follower	12 Mo.	CP-L 3101
Soils Unit	Molds	12 Mo.	AASHTO T 99/AASHTO T 180 / CP-L 3101
Soils Unit	Standard Metal Specimen	12 Mo.	CP-L 3101
Soils Unit	Straight edge	6 Mo.	AASHTO T 99 / AASHTO T 180
Soils Unit	R-Value Equipment	12Mo.	CP-L 3101
Soils Unit	Vacuum System	24 Mo.	AASHTO T 100

Calibration, Verification, and Check of Equipment Inventory							
Region Lab: _____							
Equipment	Manufacturer	Model	Serial No.	Equip. No.	Date Purchased	Date in Service	Condition Received
<b>Soils Equipment</b>							
<b>Flexible Pavement Equipment</b>							
<b>Concrete</b>							
<b>Aggregates</b>							



## Protocol for Round Robin Materials Testing of CDOT Region & Consultant Laboratories - 18

**SCOPE:** Round robins are conducted every year in the winter. It provides all participating labs the opportunity to look at their procedures and results in relation to other test labs.

### **PARTICIPANTS:**

The Lab Manager contacts all of the previous year's participants to find their interest in the round robin. New labs may also be invited to participate. The Regions are contacted for information about consultant test labs that should be included. With a clear idea of the number of participants and the quantity of samples that will be needed, the various laboratories obtain enough materials for the round robin testing.

### **MATERIALS:**

#### ***Flexible Pavement:***

A typical project mix design is chosen for the Round Robin. Flexible Pavement personnel sample aggregates for the testing. A binder supplier is contacted to supply the binder. The mix design is run in the Flexible Pavement Unit to be sure that material changes will not affect the mix design. Slight gradation changes may be made to produce a reasonable mix, and the final mix design is produced. Alternatively, a Plant Mixed Sample may be sampled and distributed.

#### ***Soils:***

A typical soil sample is chosen for the Round Robin. Soils lab personnel acquire soils for the testing.

#### ***Concrete & Physical Properties:***

A concrete mix is chosen for the round robin. A local concrete supplier is contacted to supply the mix.

Along with the concrete sample, samples for CP 37 *Plastic Fines in Graded Aggregates and Soils by the Sand Equivalent Test* and CP-L4102 *Specific Gravity and Absorption of Fine Aggregate* will be distributed.

### **SAMPLE PREPARATION:**

#### ***Flexible Pavement:***

**Laboratory Mixed Sample Procedure:** Flexible Pavement personnel run the aggregates through the Physical Properties Lab. Aggregate and binder are reduced for the ignition oven correction factor that is run by each lab. Flex personnel then mix the Hot Mix Asphalt (HMA) to within 1 gram of the mix design binder content. Mixing times and temperatures are tightly controlled and kept constant between cans of mix. Samples are distributed, with the correction factor materials, to each round robin participant.

**Plant Mixed Sample Procedure:** Material from a project with a desired mix design is selected. The appropriate quantity is sampled from an approved location per CP 41 and placed in sample cans. The HMA samples are shipped to the Central Lab for evaluation. Samples are distributed, with the correction factor materials, to each round robin participant.

Required round robin tests may include:

- AC content (CP-L 5120)
- Gradation from burn-off (CP-L 5120)
- Maximum specific gravity (CP 51)
- Bulk specific gravity (CP 44)
- Air voids (CP-L 5115)
- Stability (CP-L 5106)
- Tensile strength ratio (CP-L 5109)

Directions and a worksheet for reporting results are also provided. The directions specify heating times and temperatures, CPs and CP-Ls to use, what samples to split out of each can, and a phone number for questions.

Alternate methods of round robin sample preparation may be implemented, with the approval of the MAC. Alternate methods may include unmixed samples, samples provided as individual aggregate components with a batch sheet, samples procured from a third party, samples delivered as individual test sizes, or a variation thereof.

#### ***Soils:***

Soils lab personnel split the field material over the #4 screen and process the coarse aggregates. Soil and aggregates are recombined for the mechanical analysis. A moisture content sample is packaged separately and included with the material for

Atterburg Limits. Ten pound samples of minus #4 material are split for proctor density. For the R-Value test, a 4800-gram sample of minus #4 will be provided. When a sulfate content test sample is requested, a 500 gram sample of minus #40 material and/or a vial of sulfate solution will be provided. The sulfate sample will be tested using CP-L 2103. Directions and a worksheet for reporting results are provided. The directions specify the test methods to be used, the accuracy used in reporting results, and a phone number to call with questions.

**Concrete & Physical Properties:**

Cylinders will be cast and cured according to AASHTO T 23 *Making and Curing Concrete Test Specimens in the Field*. The cylinders will be cured at the Central Laboratory and distributed to the participants. The participants will cure the cylinders and break the cylinders on the designated date according to ASTM C 39 *Compressive Strength of Cylindrical Concrete Specimens*.

The fine aggregate is sampled in accordance to AASHTO T 2 *Sampling Aggregates* from the stockpile and reduced in accordance to AASHTO T 248 *Reducing Samples of Aggregate to Testing Size* to approximately 1,500-gram samples.

**NOTIFICATION OF RESULTS:**

Round Robin Participants receive an electronic report. A lab's rating is determined through application of standard deviations to the data average. The AMRL method is followed. Scores that are greater than 3 standard deviations from the mean will not be used to calculate the statistics. The rating system is described as follows:

Rating 5 is for test results within  $\pm 1.0$  standard deviation.

Rating 4 is for test results between  $\pm 1.0$  to  $\pm 1.5$  standard deviations

Rating 3 is for test results between  $\pm 1.5$  to  $\pm 2.0$  standard deviations.

Rating 2 is for test results between  $\pm 2.0$  to  $\pm 2.5$  standard deviations.

Rating 1 is for test results between  $\pm 2.5$  to  $\pm 3.0$  standard deviations.

Rating 0 is for test results greater than  $\pm 3.0$  standard deviations.

The best possible AMRL rating is 5, and the worst possible rating is 0. Any CDOT lab with an AMRL rating that is 2 or less is judged to be marginal and needs to be either addressed or investigated during the lab inspection.

**REPORT:**

Participants receive an electronic round robin report. The report contains the following: cover sheet with CDOT logo, author's address, and the year and type of round robin results.

Table of Contents:

- Introduction,
- General sampling and testing procedures that are used,
- Data evaluation section that explains the AMRL rating system that was used,
- The results section briefly describes what tests were run and what two standard deviations includes (95.5 % of the test results),
- State what procedural differences exist from last year's round robin,
- The acknowledgment thanks all that helped with the round robin,
- Tables with test results and ratings for all labs, although the labs are only identified through the sample numbers that they received.
- Graphs of the distribution of test results for each test performed and a scatter plot if applicable.

**MISCELLANEOUS:**

If a participating lab has one or more individual test ratings of two or less, they may obtain a 2<sup>nd</sup> sample for retesting after the report has been distributed. New test material may be provided so that the lab may rerun the material, if the material is not time sensitive. Only their original results will be used in the round robin report.

All lab results will be kept confidential. The latest round robin results will be included in the Region Lab Inspection Report.

Inviting all labs doing CDOT work may be impractical, as much work is needed to sample the materials.

It's possible that Region Mobile labs won't be up and running in the winter when the round robin material is distributed. Material for the Mobile labs is still sent out. When the lab is operating, the round robin material will be tested and the

results will be submitted to the Central Laboratory to be compared to the round robin data and for inclusion in the Region Materials Inspection Report. While it would then be too late to include the Mobile lab's data in the round robin report, the Region could look at the round robin data to gain feedback about their equipment and procedures.

**DISTRIBUTION:**

- 1) Reports to industry are sent to the management of industry labs.
- 2) Reports to CDOT Regions are sent to the Region Materials Engineer for review and internal distribution.
- 3) Program Managers retain reports concerning their Unit.
- 4) The Documentation Unit receives an electronic copy for file retention and posting on the web site.

## Protocol for the Audit of Region Materials IA Sampling and Testing Program by the Central Materials Laboratory - 18

**AUTHORITY:** The Code of Federal Regulations (23 CFR Part 637) require that for all State DOTs (SHA) an Independent Assurance Program be implemented. The “Independent Assurance samples and tests or other procedures shall be performed by qualified testing personnel employed by the SHA or its designated agent” (637.205 Policy). The Central Materials Laboratory ensures compliance by performing triennial audits of the Regions’ IA programs. The QA Program Chapter, Subsection 6.11.1, of the Field Materials Manual, which is reviewed and approved by the FHWA, documents this Inspection.

**OVERVIEW:** Every two years a team from the Central Laboratory and the FHWA reviews the Independent Assurance Program established by the Region. A report is written documenting the results of the audit.

**TEAM MEMBERSHIP:** The team will consist of the Pavement Design Program Manager and the Documentation Unit Representative. The Program Manager may delegate leadership to another Professional Engineer within the Unit. The FHWA may provide a representative to accompany and participate in the audit.

**SCHEDULING AUDITS:** The Team Leader contacts each of the Region Materials Engineers and schedules the audits at mutually convenient times and dates. The RME should ensure the availability of the Region’s IA Tester(s). It is advisable to avoid the busiest months of the construction season, and to schedule in conjunction with the Final Materials Review and Acceptance Process Audit.

**AUDIT QUESTIONNAIRE:** The Documentation Unit will develop and distribute a questionnaire to assist in the investigation of the CDOT Independent Assurance program. This document may include issues raised at the previous IA Testers Meeting.

**CONDUCT OF AUDITS:** The team shall distribute the questionnaire to the Region Materials Engineer (RME) and the IA Tester(s) approximately four weeks prior to the scheduled audit date. Two weeks will be allowed for the completion and return of the questionnaires. The Region’s questionnaire will be reviewed with the IA Tester(s) and the RME at the time of the audit to ensure accuracy and a complete understanding of all applicable activities.

**REPORTING OF AUDIT RESULTS:** The Team Leader shall write a report documenting the results of each Region’s audit. Each Region’s report provides an overall assessment of the Region’s independent assurance program and identifies any deficiencies. Innovative features, which improve the effectiveness of the program, should also be noted. Draft reports will be distributed to the Region Materials Engineers for comments prior to them being submitted to the MAC for approval. Each Final Report, with the questionnaire, is then distributed. The Reports must be written and distributed by June 30<sup>th</sup>.

**DISTRIBUTION LIST:**

- FHWA - Direct Recipient
- Chief Engineer
- Director of Project Support
- Region Transportation Director
- Program Engineer
- Resident Engineer
- Region Materials Engineer

## Protocol for the Audit of Region Materials Final Materials Review and Acceptance Process by the Central Materials Laboratory - 19

**AUTHORITY:** The Code of Federal Regulations (23 CFR Part 637) require that for all State DOTs (SHA) a quality assurance program shall provide for an acceptance program and an independent assurance (IA) program. The Central Materials Laboratory ensures compliance by performing triennial audits of the Region's project documentation. A review of required CDOT Forms and Documents within the completed Project's File is mandated to ensure compliance with the Documentation Chapter of the Field Materials Manual.

**OVERVIEW:** Every two years a team from the Central Laboratory and the FHWA perform a Quality Audit. This is divided into two parts, a questionnaire and randomly selecting a minimum of three CDOT projects that have been completed during the previous three years within each of the Regions. A report is written documenting the results of the audit.

**TEAM MEMBERSHIP:** The team will consist of the Pavement Design Program Manager and the Documentation Unit Representative. The Program Manager may delegate leadership to another Professional Engineer within the Unit. The FHWA will be invited, and may provide a representative to accompany and participate in the audit.

**SCHEDULING AUDITS:** The Team Leader contacts each Region Materials Engineer and schedules the audits at mutually convenient times and dates. The RME should ensure the availability of the Region's Materials Documentation Coordinator and/or the Region's Finals Engineer, if applicable. It is advisable to avoid the busiest months of the construction season, and to schedule in conjunction with the IA Sampling and Testing Program Audit.

**AUDIT QUESTIONNAIRE:** The Documentation Unit will develop and distribute a questionnaire to assist in the investigation of the CDOT finals materials documentation program.

**AUDIT CHECKLIST:** The Documentation Unit will develop and maintain a checklist to assist in and document the audit.

**CONDUCT OF AUDITS:** The team shall distribute the questionnaire to the Region Materials Engineer (RME) and the Finals Materials Documentation Coordinator approximately four weeks prior to the scheduled audit date. Two weeks will be allowed for the completion and return of the questionnaires. The Region's questionnaire will be reviewed with the Finals Materials Documentation Coordinator, Finals Engineer, and the Region Materials Engineer at the time of the audit to ensure accuracy and a complete understanding of all applicable activities. The CDOT Project Files will be reviewed to ensure compliance with the Finals Materials Documentation Checking Procedure as stated in each of the Documentation chapters of the FMM. Review of all documentation from throughout the duration of the project is acceptable. Review of the Management of Consultant Materials Testing (CP 16) is optional based on the Region.

**REPORTING OF AUDIT RESULTS:** The Team Leader shall write a report documenting the results of each Region's audit. Each Region's report provides an overall assessment of the Region's Final Materials Review and Acceptance Process and identifies any deficiencies. Innovative features, which improve the effectiveness of the program, should also be noted. Draft reports will be distributed to the Region Materials Engineers for comments prior to them being submitted to the MAC for approval. Each Final Report is then distributed. The Reports must be written and distributed by June 30<sup>th</sup>.

**NOTE:** In accordance with the Documentation – CDOT Maintenance and Local Agency Chapter CDOT MTCE Projects will be included in 2018. A Maintenance Protocol for Audit will be written.

**DISTRIBUTION LIST:**

- FHWA - Direct Recipient
- Chief Engineer
- Director of Project Support
- Region Transportation Director
- Program Engineer
- Resident Engineer
- Region Materials Engineer

## Protocol for the Audit of Local Agency Final Materials Review and Acceptance Process by the Central Materials Laboratory - 18

**AUTHORITY:** The Code of Federal Regulations (23 CFR Part 637) require that for all State DOTs (SHA) a quality assurance program shall provide for an acceptance program and an independent assurance (IA) program. The Central Materials Laboratory ensures compliance by performing triennial audits of the Region's project documentation. A review of required CDOT Forms and Documents within the completed Project's File is mandated to ensure compliance with the Documentation Chapter of the Field Materials Manual.

**OVERVIEW:** Every two years a team from the Central Laboratory and the FHWA perform a Quality Audit. This is divided into two parts, a questionnaire and randomly selecting a minimum of two local agency projects that have been completed during the previous three years within each of the Regions. A report is written documenting the results of the audit.

**TEAM MEMBERSHIP:** The team will consist of the Pavement Design Program Manager and the Documentation Unit Representative. The Program Manager may delegate leadership to another Professional Engineer within the Unit. The FHWA will be invited, and may provide a representative to accompany and participate in the audit.

**SCHEDULING AUDITS:** The Team Leader contacts each Region Materials Engineer and schedules the audits at mutually convenient times and dates. The RME should ensure the availability of the Region's Local Agency Coordinator and any applicable staff involved in the process. It is advisable to avoid the busiest months of the construction season, and to schedule in conjunction with the IA Sampling and Testing Program Audit and the Final Materials Review and Acceptance Process Audit.

**AUDIT QUESTIONNAIRE:** The Documentation Unit will develop and distribute a questionnaire to assist in the investigation of the CDOT local agency program.

**AUDIT CHECKLIST:** The Documentation Unit will develop and maintain a checklist to assist in and document the audit of the actual project.

**CONDUCT OF AUDITS:** The team shall distribute the questionnaire to the Local Agency Coordinator approximately four weeks prior to the scheduled audit date. Two weeks will be allowed for the completion and return of the questionnaires. The Region's questionnaire will be reviewed with the Local Agency Coordinator and the Region Materials Engineer at the time of the audit to ensure accuracy and a complete understanding of all applicable activities. The local agencies' project files will be reviewed to ensure compliance with the Finals Materials Documentation Checking Procedure as stated in the Documentation chapter of the CDOT Field Materials Manual. The intent is to also ensure compliance with CDOT's Local Agency Manual – Addendum for Materials Testing & Documentation.

**REPORTING OF AUDIT RESULTS:** The Team Leader shall write a report documenting the results of each Region's audit. Each Region's report provides an overall assessment of the Region's Local Agency Review and Acceptance Process and identifies any deficiencies. Innovative features, which improve the effectiveness of the program, should also be noted. Draft reports will be distributed to the Region Materials Engineers and Local Agency Coordinators for comments prior to them being submitted to the MAC for approval. Each Final Report is then distributed. The Reports must be written and distributed by June 30<sup>th</sup>.

**DISTRIBUTION LIST:**

- FHWA - Direct Recipient
- Chief Engineer
- Director of Project Support
- Region Transportation Director
- Program Engineer
- Resident Engineer
- Region Materials Engineer