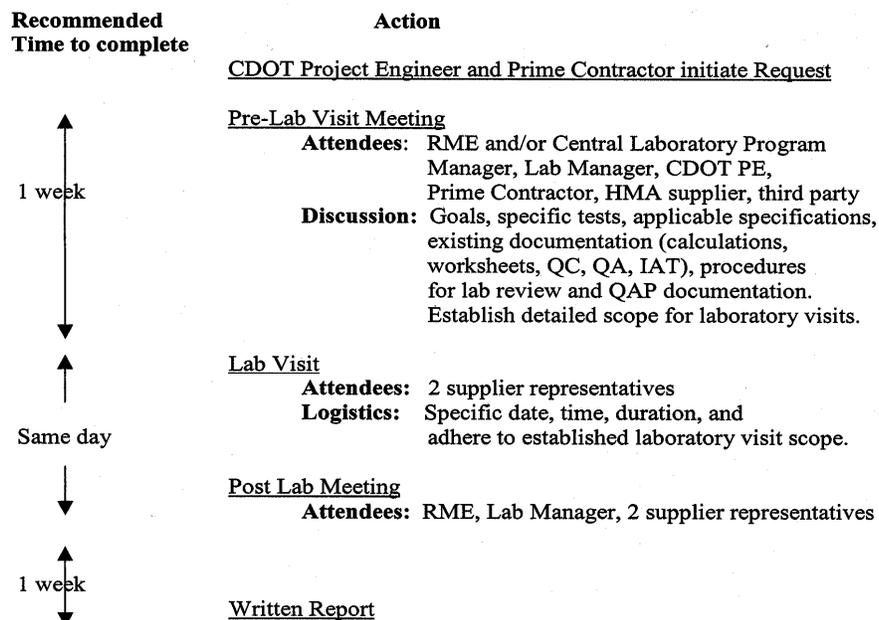


## Inspections: Central Laboratory of the Regions

- Protocol for Open Laboratory Review of a CDOT Materials Testing Laboratory
- Protocol for the Inspection of Region Materials Laboratories by the Central Materials Laboratory
- Protocol for Round Robin Materials Testing of CDOT Region & Consultant Laboratories
- Protocol for the Audit of Region Materials IA Sampling and Testing Program by the Central Materials Laboratory
- Protocol for the Audit of Region Materials Finals Materials Review and Acceptance Process by the Central Materials Laboratory

### 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.



## Protocol for the Inspection of Region Materials Laboratories by the Central Materials Laboratory - 2014

**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 writes 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 Staff Services  
Region Materials Engineer  
FHWA  
Chief Engineer  
Documentation Unit

<b>COLORADO DEPARTMENT OF TRANSPORTATION</b> <b>REPORT ON CENTRAL LABORATORY TO REGION LAB INSPECTION</b> <small>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.</small>		
Region	Location	Date
<b>Region personnel present during inspection</b>		<b>Central Laboratory personnel present during inspection</b>
Name and title		Name and title
<b>General</b>		<b>Rating</b>
1. Lab cleanliness & housekeeping? (Good/Fair/Poor)		
2. Equipment cleanliness & functionality? (Good/Fair/Poor)		
3. Region Quality Manual present, current & complete? (Y/N)		
4. Scales: Certified & level? (Y/N/NA)		
5. Ovens: Accurate or temperature corrected? (Y/N/NA)		
6. Thermometers: Certified or verified? (Y/N/NA)		
7. Sieves in good condition & within specification? (Y/N/NA)		
8. Sieving adequacy performed annually for coarse & fine aggregate? (Y/N/NA)		
9. Tester certifications present and complete? (Y/N)		
10. Current CDOT Field Materials Manuals, Laboratory Manual of Test Procedures, & CDOT Forms? (Y/N/NA)		
<b>Comments</b>		
<b>Aggregates</b> Applicable ( <input type="checkbox"/> Y <input type="checkbox"/> N )		<b>Rating</b>
1. Aggregate splitter in good condition, correct size & number of openings? (Y/N/NA)		
2. Coarse specific gravity equipment within specifications? (Y/N/NA):		
3. Fine specific gravity equipment within specifications? (Y/N/NA)		
4. Sand equivalence equipment within specification? (Y/N/NA)		
5. L.A. Abrasion machine & Spheres within specification? (Y/N/NA)		
6. Fine Aggregate Angularity apparatus within specification? (Y/N/NA)		
7. Fine Aggregate Angularity cylinder calibrated & logged? (Y/N/NA)		
8. Lime wash water pressure set at 10 PSI? (Y/N/NA)		
9. Micro Deval equipment within specification? (Y/N/NA)		
<b>Comments</b>		

Concrete	Applicable ( <input type="checkbox"/> Y/ <input type="checkbox"/> N)	Rating	Equip ID# (Y/N/NA)
1. Curing tank at correct temperature? (Y/N/NA)			
Recording thermometer present & accurate? (Y/N/NA)			
Curing tank water saturated with lime? (Y/N/NA)			
Curing tank water is being circulated? (Y/N/NA)			
Curing tank water fully immerses specimens? (Y/N/NA)			
2. Concrete testing equipment:			
Air meter calibrated & accurate? (Y/N/NA)			
Slump cone dimensions accurate? (Y/N/NA)			
Strike off plate for unit weight within specification? (Y/N/NA)			
Tamping rods and mallets within specification? (Y/N/NA)			
Cylinder molds within specification & source documented? (Y/N/NA)			
Beam molds within specification? (Y/N/NA)			
3. Concrete compression machine:			
Certified within the last 12 months? (Y/N/NA)			
Platen & head meet specification? (Y/N/NA)			
Compression head rotates & tilts freely at least 4° in any direction? (Y/N/NA)			
Compression head inscribed concentric circles within specification? (Y/N/NA)			
Condition of retainer rings within specification? (Y/N/NA)			
Neoprene pad use logged? (Y/N/NA)			
Neoprene pad's shore hardness recorded & meets specification? (Y/N/NA)			
Beam apparatus within specification? (Y/N/NA)			
<b>Comments</b>			

Asphalt	Applicable <input type="checkbox"/> Y <input type="checkbox"/> N	Rating	Equip ID# (Y/N/NA)
1. Square splitting pan for asphalt within specification? (Y/N/NA)			
Square sided scoop for asphalt within specification?(Y/N/NA)			
2. Maximum specific gravity (Rice) set up within specification? (Y/N/NA)			
Manometer free of air? (Y/N/NA)			
Pump oil free of water? (Y/N/NA)			
Desiccating crystals free of water? (Y/N/NA)			
Flasks calibrated and logged? (Y/N/NA)			
Vacuum pump pressure at 28 ± 2 mm Hg? (Y/N/NA)			
3. Bulk specific gravity equipment:			
a. Tank at correct temperature? (Y/N/NA)			
b. Suspension wire of small diameter? (Y/N/NA)			
4. SuperPave compactor checked? (Y/N/NA)			
Gyratory compactor angle checked with TMA? (Y/N/NA)			
5. Gyratory compactor molds within specification? (Y/N/NA)			
6. Gyratory ram head diameter & base plate within tolerance? (Y/N/NA)			
7. Compression testing machine certified &/or checked within the last 12 months? (Y/N/NA)			
8. Program correct for Stabilities & Lottmans? (Y/N/NA)			
9. Ignition furnace has correct settings programmed? (Y/N/NA)			
10. Freezer within specification? (Y/N/NA)			
11. Incubator within specification? (Y/N/NA)			
12. Water baths within specification? (Y/N/NA)			
13. Stabilometer checked and within specification? (Y/N/NA)			
<b>Comments</b>			

Soils	Applicable ( <input type="checkbox"/> Y/ <input type="checkbox"/> N)	Rating	Equip ID# (Y/N/NA)
1. Compaction equipment:			
Compaction base of sufficient mass? (Y/N/NA):			
T99 manual rammer within specification? (Y/N/NA)			
T99 mechanical hammer within specification? (Y/N/NA)			
T180 manual hammer within specification? (Y/N/NA)			
T180 mechanical hammer within specification? (Y/N/NA)			
6" molds within specifications? (Y/N/NA)			
4" molds within specifications? (Y/N/NA)			
Straightedge (strike-off bars) within specifications? (Y/N/NA)			
2. Atterberg Equipment:			
Liquid limit device within specification? (Y/N/NA):			
Grooving tool within specification? (Y/N/NA)			
3. R-value equipment:			
Kneading compactor calibrated at required intervals? (Y/N/NA)			
Tampers foot meets dimensional limits? (Y/N/NA)			
Molds, dimensions within specifications? (Y/N/NA)			
4. Nuclear M/D gauges calibrated within 2 years & checked within 1 year? (Y/N/NA)			
5. Sulfate test equipment:			
Sulfate standard not expired & at proper concentration? (Y/N/NA)			
Correction curve generated for current batch of BaCl & not older than 6 months? (Y/N/NA)			
Glass test vials clear & unclouded? (Y/N/NA)			
Colorimeter set to correct program or proper colorimeter used? (Y/N/NA)			
BaCl reagent not expired? (Y/N/NA)			

**Comments**

**Distribution:**

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

ASPHALT LAB INSPECTION - FORM 520

REGION \_\_\_\_\_  
 LOCATION \_\_\_\_\_  
 DATE \_\_\_\_\_

Asphalt Laboratory Equipment		Passed		Applicable
Procedure	Description	Yes	No	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
		<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
G-1	Balance Verification of Calibration	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
G-2	Oven Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-1	Standardization of Low Temperature Oven and Freezer	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-2	Superpave Gyratory Compactor Mold Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-3	SuperPave Gyratory Compactor Ram Head Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-4	Stabilometer Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-5	Troxler Gyratory Compactor True Mold Angle Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-6	Maximum Specific Gravity and Lottman System Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-7	Standardization of Water Baths	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-8	Troxler Gyratory Compactor Pressure Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-9	Troxler Gyratory Compactor CDI Angle Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-10	Troxler Gyratory Compactor Height Calibration & Rotation Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-11	United Press Load Cell Calibration Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
HMA-12	Troxler Gyratory Compactor Region Load Cell Pressure Check	<input type="checkbox"/>	<input type="checkbox"/>	( <input type="checkbox"/> Y/ <input type="checkbox"/> N)
<b>Comments</b>				

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<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 Gyrotory Compactor, Verify Ram Pressure, Angle of Gyration, Frequency of Gyration, LVDT	12 Mo.	HMA-4, 5, 6, 7
Flex. Pvmt	Superpave Gyrotory Compactor, Verify Ram Head and Base Plate	12 Mo.	HMA-2 & 3
Flex. Pvmt	Superpave Gyrotory Compactor Calibration Load Cell	12 Mo.	Certified Contractor or HMA-12
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

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

**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, plus 10% for retesting.

### **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.

#### ***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:***

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.

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 plant mixed samples, 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 letter that thanks them for their participation, informs them of their laboratory number and explains what they are receiving. For labs with concerning results, a statement expressing our desire to figure out where they went wrong is included. Participants receive a report with just their lab's results and their consequent ratings. Their 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 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, our address, and the year and type of round robin results.

Table of Contents:

- Introduction that names all round robin participants,
- 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 can numbers that they received. Further, the results are put into a table containing only CDOT data and ratings and into a table containing only Industry data and ratings, when applicable,
- 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 are contacted and informed of their ratings. New test material may provided so that the lab may rerun the material, if the material is not time sensitive. 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. Using local materials helps to ease this problem.

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**

**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 three 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 inspections 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.

**AUDIT QUESTIONNAIRE:** Prior to the audits a questionnaire will be distributed to the Region to assist and facilitate the review. This document may include issues raised at the previous IA Testers Meeting.

**CONDUCT OF AUDITS:** The team shall meet with the Region Materials Engineer and the technician(s) involved with the Independent Assurance Program. The program is reviewed following the established audit questionnaire. Additional questions and/or concerns will be addressed as they arise.

**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 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 Staff Services
- 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**

**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 three years a team from the Central Laboratory and the FHWA perform a Quality Audit of two randomly selected projects that have been completed during the previous two 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 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 CHECKLIST:** The Documentation Unit will develop and maintain a checklist to assist in and document the audit.

**CONDUCT OF AUDITS:** The team shall meet with the Region Materials Engineer and the Region's Materials Documentation Coordinator, and/or the Region Finals Engineer. The Project Files will be reviewed to ensure compliance with the Finals Materials Documentation Checking Procedure as stated in the Documentation chapter of the Field Materials Manual. 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 Region requirements.

**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>.

**DISTRIBUTION LIST:**

- FHWA - Direct Recipient
- Chief Engineer
- Director of Staff Services
- Region Transportation Director
- Program Engineer
- Resident Engineer
- Region Materials Engineer