

## MATERIALS

### CHAPTER 9

The CDOT Project Manager should consult with the Region Materials Engineer on questions pertaining to materials prior to completion of the CDOT Form 1243 – Local Agency Contract Administration Checklist and prior to execution of the IGA. The Region Materials Engineer should also be consulted on an as needed basis regarding material questions before, during and upon completion of construction. The CDOT Project Manager will submit an electronic copy of the award set of plans and specifications to the Region Materials Engineer.

Guidance on activities before, during, and after construction, as well as proper completion of CDOT Forms 250 and 379, and the Letter of Materials Certification can be found in the Documentation Chapter of the applicable [CDOT Field Materials Manual](#).

#### 9.1 Conduct Materials Preconstruction Meeting

The CDOT Project Manager and the Local Agency determine if a meeting is needed with the CDOT Region Materials Engineer to discuss and define material issues concerning the project and to review Section 9 of the CDOT Form 1243 – Local Agency Contract Administration Checklist.

Prior to the preconstruction meeting, the Local Agency should study the plans, CDOT Form 250, and the applicable [CDOT Field Materials Manual](#) to review materials testing and documentation requirements, as well as the Local Agency's involvement in the project materials testing and documentation process. The award set of plans will be reviewed for specifications and budget; e.g., funds availability for pre-inspection, charges for independent assurance sampling and testing, laboratory check tests, and mix designs. The review will also include materials that should be tested but are not identified in a particular bid item.

The Project's Materials Books should be set up by the Local Agency prior to beginning construction and maintained during the project. The books should follow the format described in the CDOT Field Materials Manual Documentation Chapter section titled,

“Organizational Guide for Project Material Books”. During CDOT’s transition from paper to electronic medium, Materials Books are acceptable in hard copy or electronic format.

If electronic Materials Books are to be utilized, an electronic folder structure should be set up and documents organized similarly to that recommended in the “Organizational Guide for Project Materials Books” in that folders should be created for each item in sequential order to aid in locating paperwork.

## 9.2 Complete CDOT Form 250 – Materials Documentation Record

The CDOT Form 250 is used to track materials used on a project, the minimum number of tests needed for each product, material or bid item (or both), and to identify the forms used to record test results. The form designates test frequencies for project acceptance testing and laboratory check testing.

### 9.2.1 Prior to Construction

The initial Form 250 is to be developed by the CDOT Materials and Geotechnical Services Branch from the award set of plans and specifications provided by the CDOT Local Agency Coordinator/Project Manager. All information listed below should be submitted in one packet to the Materials and Geotechnical Services Branch using the email address [cdot\\_pavement.design@state.co.us](mailto:cdot_pavement.design@state.co.us):

- An award set of Plans and Specifications
- Bid Date
- Award Date
- Engineer’s Estimate and / or Tabulation of Bid Items (separate from plans and specifications)
- Project contact person(s) with phone numbers and email addresses
- Name, address, and phone number(s) of the Contractor to whom the project was awarded

Project bid items should be provided in the pay unit stated in the [CDOT Standard Specifications](#). For example, Pay Item 403, Hot Mix Asphalt, should use a pay unit of tons, and Pay Item 304, Aggregate Base Course, should use a pay unit in tons or cubic yards. If the project has been set up to use an item numbering format that is different

than that utilized by CDOT, the Local Agency shall provide a document to the CDOT Local Agency Coordinator or CDOT Project Manager converting the items used for the project to the respective CDOT standard item number. This conversion document is to be provided along with the award set of plans and specifications as listed above.

The CDOT Local Agency Coordinator or CDOT Project Manager may request a small quantity exception for specific items on the Form 250 from the CDOT Region Materials Engineer if a project has only small quantities as defined by the [Owner Assurance \(OA\) Frequency Guide Schedule](#) of the applicable [CDOT Field Materials Manual](#). All testing shall follow the schedule in the Field Materials Manual, unless an exception is approved by the CDOT Region Materials Engineer.

The Form 250 in Appendix A presents the major bid items from a typical project.

### **9.2.2. During Construction**

The Local Agency shall update the Form 250 as work progresses. This includes added material items, material item reductions, and sampling and testing deviations.

### **9.2.3. After Construction**

Complete and distribute the Form 250 in accordance with subsection 9.10. If the Local Agency uses a consultant tester on the project, a professional engineer with the consulting company must electronically sign and seal the last page of the Form 250.

## **9.3 Perform Project Acceptance Samples and Tests**

Project acceptance samples and tests are used to determine the quality and acceptability of the material being sampled and workmanship that have been or are being incorporated into a construction project. The samples and tests are taken and performed by qualified Local Agency or qualified Local Agency approved consultant personnel.

### 9.3.1. Prior to Construction

Identify any items that require pre-inspection.

### 9.3.2. During Construction

Acceptance testing and documentation shall be performed on the project. Acceptance testing and documentation will follow the applicable [CDOT Field Materials Manual](#) and the project specifications.

On projects with any Federal-aid Highway funding, the Local Agency shall ensure that all steel and iron products permanently incorporated in the work are domestically produced in accordance with the *CDOT Field Materials Manual*, [Special Notice to Contractors](#), Section 4. On projects with no federal funding, Federal-aid Highway Buy America requirements for iron and steel do not apply.

On projects with other federal funding not related to the Federal-aid Highway funds, such as Federal Recovery Funds, the Local Agency shall comply with the requirements of Title 2 CFR 200.322, Domestic preferences for procurements, and indicate a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including, but not limited to iron, aluminum, steel, cement, and other manufactured products).

On projects which include both Federal-aid Highway and Federal Recovery Funds, Federal Buy America requirements for iron and steel will apply. However, the waiver process outlined in Title 23 CFR 635.410, Buy America, will not be allowed.

### 9.3.3. Non-Specification Material

If specification material is not being produced or provided, the Local Agency shall take appropriate action as defined in the specifications; i.e., price reduction, rejection, or non-payment. For further direction, refer to Section 105 of the [CDOT Standard Specifications](#). See subsections 8.12 and 8.13 of this *Desk Reference* if a change order is required.

## 9.4 Perform Laboratory Acceptance Tests

Random representative samples should be submitted to the approved laboratory of the Local Agency to verify acceptability of field-produced material. The laboratory will perform tests that generally are not within the capabilities of the project acceptance testers' equipment.

### 9.4.1 Prior to Construction

Laboratory verification tests and/or acceptance test methods should be defined; e.g., AASHTO, ASTM (American Society for Testing and Materials), Colorado Procedures, Colorado Procedures – Laboratory, or Marshall vs. Superpave Gyratory compactor.

The *CDOT Field Materials Manual*, [CP 13](#), provides standard procedures for “Check Testing.” With CDOT’s concurrence, the Local Agency approves the laboratory to perform check tests.

### 9.4.2 During Construction

The Local Agency approved laboratory will perform the laboratory acceptance tests (Refer to the Central Lab column in the *CDOT Field Materials Manual* owner acceptance (OA) guide schedule) at the frequency in the *Field Materials Manual* and/or in the specifications. The purpose of verification tests is to assure that all materials incorporated into the project meet the design and specifications. The tests performed by the approved laboratory generally require specialized equipment that is not available to field acceptance testers such as asphalt cement tests for dynamic shear, R values of soils, or hot mix asphalt stability.

## 9.5 Accept Manufactured Products

Manufactured products are typically accepted based on Pre-Inspection (PI), [Certified Test Reports \(CTR\)](#), [Certificates of Compliance \(COC\)](#), Pre-Approval ([APL](#), listed on CDOT’s approved products list website), or a combination thereof. In specific industries the Manufacturers must be first listed on the [Qualified Manufacturers List \(QML\)](#) before

product acceptance can be considered. Refer to the [Special Notice to Contractors](#) in the applicable [Field Materials Manual](#). Certificates of Compliance and Certified Test Report stamp forms are available on the *Field Materials Manual* site.

If CDOT is responsible for pre-inspection, the CDOT Project Manager should verify that the Staff Bridge Fabrication Inspectors, (303) 757-9192, have a copy of the award set of plans/specifications, reviewed shop drawings, a suppliers list, and funding for pre-inspection in the project budget. Inspection of structural components will include, but not be limited to, the following:

- Fabrication of structural steel and pre-stressed concrete structural components
- Bridge modular expansion devices (0" to 6" or greater)
- Fabrication of bearing devices

## 9.6 Approve Sources of Materials

The Contractors list of material sources and suppliers will be reviewed and approved against the requirements of [CP 11](#), the [Qualified Manufacturers List \(QML\)](#), and the [Approved Products List \(APL\)](#).

## 9.7 Independent Assurance Testing (CDOT Form 379)

The Independent Assurance Testing Program defines the tests required to provide an independent check on the reliability of project acceptance samples and tests. The Independent Assurance Testing Program is defined in the [CDOT Field Materials Manual](#), QA Procedures and Independent Assurance Schedule sections. Testing requirements are determined by planned quantity.

### 9.7.1 Prior to Construction

For projects on the NHS:

Federal law requires Independent Assurance Testing on projects on the NHS. The Local Agency may, under the direction and approval of the Region Materials Engineer, administer the Independent Assurance Testing Program on projects, provided it uses an

AASHTO Accredited Laboratory, that is independent from the project acceptance testing lab, uses qualified personnel for testing and observations, performs the calibration equipment checks, and follows all applicable sections of [CDOT Field Materials Manual](#) chapters on the “[QA Procedures](#)” and “[IA Frequency Guide Schedule for Evaluation of OA Sampling and Testing](#)”. CDOT may elect to conduct Independent Assurance Testing when the project is within CDOT ROW or on the NHS.

The initial CDOT Form 379 – Project Independent Assurance Sampling Schedule (see Appendix A), developed from the award set of plans and specifications, will be prepared by the Local Agency or the CDOT Region Materials Engineer as established on the Form 1243 – Local Agency Contract Administration Checklist. It will be distributed to the:

- Project file of entity managing construction, original
- Local Agency
- Project Manager
- Region Materials Engineer
- Materials and Geotechnical Branch, Documentation Unit

For projects not on the NHS:

CDOT requires Independent Assurance Testing. The Local Agency can use CDOT’s Independent Assurance Testing procedures, or if their program is approved by FHWA, they can use their own established, documented procedures to independently verify the adequacy of testing equipment and personnel.

### **9.7.2. Independent Assurance Test Notification**

If CDOT performs the Independent Assurance Testing, the Local Agency is responsible for notifying the CDOT Region Independent Assurance Tester a minimum of one week prior to the start of work on the project and a minimum of one week prior to the need for the Independent Assurance Tester for items as defined on the CDOT Form 379.

### 9.7.3. During Construction

For projects on the NHS:

The Independent Assurance Testing laboratory or the CDOT Region Materials Laboratory will perform Independent Assurance Testing and sampling as described on the CDOT Form 379 as the work progresses. The Independent Assurance Tester will update the CDOT Form 379 as the assurance tests are performed. The Independent Assurance Tester in partnership with the Local Agency will address discrepancies in test values. Assurance test results will be distributed to the Local Agency through the Project Manager and the Region Materials Engineer when CDOT performs the Independent Assurance Testing.

For projects not on the NHS:

Independent Assurance Testing shall be performed as defined by the Local Agency's policies and procedures, or using CDOT's established Independent Assurance methods.

## 9.8 Approve Mix Designs

All mix designs for concrete and hot mix asphalt will be reviewed for acceptance. The Form 1243 – Local Agency Contract Administration Checklist is used to determine which entity (CDOT or LA) is responsible for mix design approvals. Mix design approval is required prior to the use of any paving material.

### 9.8.1. Local Agency Responsibility for Approving Concrete and Hot Mix Asphalt

If the Local Agency is responsible for approving concrete and hot mix asphalt mix designs and if required by the Region, the Local Agency will submit the approval of the designs in electronic format to the Region Materials Engineer through the Project Manager. The Local Agency may ask the Region Materials Engineer to concur on the design mix. The Local Agency should submit the test results used to establish the job mix formula and the project specifications with the approved mix design submittal. See [CP 52](#) from the current [CDOT Field Materials Manual](#) for guidelines.



### **9.8.2. CDOT Responsibility for Approving Concrete and Hot Mix Asphalt**

If CDOT is responsible for approving concrete and hot mix asphalt mix designs, the Local Agency shall submit all mix design information to the Region Materials Engineer through the CDOT Project Manager.

A Job Mix Formula approval will be issued by the Region Materials Engineer for hot mix asphalt projects constructed within CDOT ROW and those projects where CDOT is the responsible entity for approval of mix designs as indicated on CDOT Form 1243.

### **9.8.3. Asphalt Content Correlation Samples**

When CDOT performs the Independent Assurance Test, the Local Agency is responsible for submitting hot mix asphalt content correlation or ignition oven correction samples to the Region Materials Laboratory prior to placement of hot mix asphalt on the project. This submittal shall be a minimum of one week before placement of hot mix asphalt. The asphalt content correlation or correction samples are necessary for assurance tests as well as laboratory check tests.

## **9.9 Check Final Materials Documentation**

All project materials shall be in compliance prior to final project acceptance.

An independent check of the final materials documentation should be performed by an individual not directly involved in the project. The final review will follow a reasonable procedure, such as that described in the [CDOT Field Materials Manual](#), “Documentation for CDOT Maintenance or Local Agency” section. This independent check will be performed using the CDOT Form 1199 page 1. The CDOT Project Manager will perform the independent audit of the materials book using the Form 1199 page 2, after the independent check is completed.

## **9.10 Complete and Distribute Final Materials Documentation**

The Local Agency’s person in responsible charge shall prepare, approve, and submit to

the CDOT Project Manager a “Letter of Materials Certification” that has been electronically signed within 30 calendar days after final project acceptance. The letter shall certify that the material incorporated into the construction work is in reasonably close conformity with the approved plans and specifications. The following documents, or similar, shall be attached to the letter (see Appendix A for copies of these forms):

1. Letter of Materials Certification, page 2, Explanation of Exceptions for a Local Agency Project with all supporting documentation that addresses any exceptions or deviations. A professional engineer must electronically sign and seal page 2.
2. A copy of the completed CDOT Form 379 – Project Independent Assurance Sampling Schedule.
3. The completed CDOT Form 250, checked, and electronically signed by the Local Agency.

The CDOT Project Manager will distribute as follows:

- Project file of entity managing construction, original
- Resident Engineer
- Region Materials Engineer
- Materials and Geotechnical Branch, Documentation Unit
- CDOT’s electronic document management system, ProjectWise Explorer / Project Share

### **9.10.1. Distribute Final Independent Assurance Testing Results**

For Projects on the NHS:

The Independent Assurance Testing Laboratory or the CDOT Region Materials Laboratory will complete and distribute the CDOT Form 379 and the explanation of deviations concerning the Independent Assurance Testing Program as follows:

- Project file of entity managing construction, original
- Local Agency
- Resident Engineer

- Region Materials Engineer
- Materials and Geotechnical Branch, Documentation Unit

For Projects not on the NHS:

Distribute to CDOT Project Manager only

### **9.11 Roles and Responsibilities on Both Federal and Non-Federal (State) Projects (unless specifically stated)**

- **Local Agency** – Responsible for:
  - Ensuring staff adhere to construction administration, inspection, and materials testing procedures in accordance with the appropriate *CDOT Field Material Manual* and this *Desk Reference*.
  - Contracting with qualified personnel as noted in the CDOT Field Materials Manual, Section 8, Sampling and Testing Personnel Qualifications, and / or Colorado Procedures 10, Qualification of Testing Personnel and Laboratories.
  - Ensuring the Local Agency’s Professional Engineer in “responsible charge of construction supervision” or his designee follows the *Before Construction, During Construction* and *After Construction* procedures stipulated in the Documentation Chapter of the applicable *CDOT Field Materials Manual*.
  - Ensuring the project’s materials documentation (materials binder) is prepared, organized, maintained, reviewed, and distributed within the time frames stipulated in the Documentation Chapter of the applicable *CDOT Field Materials Manual* and goes through the independent check requirement using the CDOT Form 1199 page 1.
  - Ensuring documents are posted in ProjectWise / ProjectShare.
  - Ensuring notifications are provided to CDOT prior to start of the work on the project.
  - Ensuring the CDOT Form 250 is updated as work progresses and CDOT Form 473LA, pages 1 and 2, is completed per instructions within the applicable *CDOT Field Materials Manual*.

- **Contractor** – Responsible for following the procedures listed in the Special Notice to Contractors from the applicable *CDOT Field Materials Manual*. Responsible for the proper inspection, sampling, testing and certification of materials and products incorporated into the construction project. For projects with Federal-aid Highway funds, prior to incorporation of steel or iron in the project, responsible for certifying in writing to the Local Agency that the delivered quantity of each material meets the contract Buy America requirements; that the original Buy America Certification from the Supplier is on file and the steel or iron products are in compliance with the plans and specifications.
- **Project Inspector / Material Tester** – Responsible for inspecting the work for compliance with plans and specifications. Responsible for initial, follow-up, completion, and final inspections of work in progress, including interim and final measurements. Responsible for completing inspection documentation, field diaries, and forms for the development of progress payments. Responsible for testing materials against the contract quality assurance specifications to ensure the project will perform as required once in service. Responsible for notifying contractor and Project Engineer of non-compliance with the contract plans and specifications.
- **Fabrication Inspector / Quality Assurance Inspectors** - Responsible for assessing and accepting or rejecting the fabricated work, the fabrication plant, and the contractor's quality control process inspection and testing personnel. Responsible for completing the CDOT Form 193B and submitting to the CDOT Fabrication Engineer.
- **CDOT**
  - Materials and Geotechnical Services Branch – Responsible for developing the CDOT Form 250.
  - Region Materials Engineer – Responsible for providing guidance on materials issues, creating the Independent Assurance Testing schedule, and reviewing and approving mix designs if designated as such on Form 1243 – Local Agency Contract Administration Checklist.
  - Quality Audit Team Members – Responsible for distributing and reviewing the project questionnaire with CDOT staff and for providing a report documenting the results of each Region's audit.

- Project Manager/Local Agency Coordinator – Responsible for providing the award set of plans, specifications and estimate to the Materials and Geotechnical Branch and the Region Materials Engineer. Responsible for requesting a small quantity exception Form 250, if applicable. Responsible for providing access to ProjectWise / Project Share to the project team and for checking for compliance. Responsible for providing oversight of the work, and preparing page 2 of the CDOT Form 1199 and performing item checks. Responsible for archiving project records in ProjectWise. Responsible for attending material audits as required.
  - Resident Engineers – Responsible for reviewing and approving CDOT forms as required.
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- **FHWA** – Overall responsibility for the Federal-aid Highway Program including those project actions which cannot be assumed by the CDOT or the Local Agency.