Section 1011 – Materials Acceptance Program

1011.1 Material Acceptance Program Overview

The UDOT Materials Acceptance Program outlines the steps used to make an informed acceptance decision based on the quality of the materials incorporated into projects. UDOT uses a combination of sampling and testing, manufacturer provided documentation, and inspection to determine materials acceptance and conformance with the approved project plans and specifications.

1011.2 Acceptance Decision based on Manufacturer Information

Acceptance of materials based on:

- Manufacturer's Certificates of Compliance
- Manufacturer's product data, specifications, and recommended installation instructions
- Manufacturer's labeling

1011.2.1 Manufacturer's Certificates of Compliance

The Contract designates when materials acceptance is based on Manufacturer's Certificates of Compliance. Certificates must meet the requirements of Standard Specification 01455. It is the responsibility of the Resident Engineer to verify that the Manufacturer's Certificates of Compliance reference the applicable contract specifications or the included referenced requirements.

1011.2.2 Manufacturer's product data, specifications, and recommended installation instructions

The Contract designates when materials acceptance can be based on Manufacturer's product data. It is the responsibility of the Resident Engineer to verify Manufacturer's claims meet applicable contract specifications or the included referenced requirements.

1011.2.3 Other

When the Contract fails to designate required documentation for the acceptance decision the Resident Engineer may use any or all of the following:

- Manufacturer's Certificates of Compliance
- Manufacturer's product data, specifications, and recommended installation instructions
- Manufacturer's labeling

Verify the Manufacturer's claims as above and document the acceptance decision.

1011.3 Materials Acceptance Based on the Approved Products List

Products that have been reviewed and approved under the following process do not require that the documentation be submitted to the Resident Engineer. The Resident Engineer will receive from the contractor an Approved Products Compliance Form for the affected material along with Material Safety Data Sheets (MSDS) and installation requirements and/or technical data. The Approved Products Compliance form will be placed in the project files to document that these items were accepted on this basis.

To submit items for placement on this list:

- The manufacturer or their representative will submit to the Approved Products List (APL) Coordinator a Preliminary Product Evaluation Form (Form R-52) with the results of all testing and certification required by governing specifications or drawings.
- APL Coordinator and Approved Products Panel (APP) will review all submittals and verify that all required documentation is included and any required recent testing (recorded date on testing report to be within one year of submittal date) has been performed by certified laboratories.

- Accepted documentation demonstrating the product meeting of specification requirements will then be stored on UDOT's database and the item will be listed on the Department's publicly accessible Materials website.
- The Resident Engineer may accept any product listed on the APL without requiring additional documentation other than the Approved Products Compliance Form, MSDS Sheets, installation requirements and/or technical data.
- Material or products on the APL are good for the duration of a construction project, provided the material or product was on the APL on the date the project was awarded and before the date of the project's final walk through.
- At four years after the date of acceptance manufacturers/suppliers will need to reapply for continued inclusion on APL based on new testing and certification. Reapplication may also be necessary if applicable standard specifications or drawings are revised.

1011.4 Material Acceptance Based on Quality Management Plans

Acceptance of material as outlined in Materials QMP's:

- 502 Cement
- 503 Reinforcing Steel Epoxy
- 504 Reinforcing Steel
- 505 Precast/Prestressed Concrete Structures
- 507 Flyash and Pozzolon
- 508 Asphalt Emulsion
- 509 Asphalt Binder
- 510 Hydrated Lime
- 512 Reinforcing Steel Galvanize Coating
- 513 Pavement Marking Paint

Some materials accepted by Quality Management Plan require additional documentation or testing as outlined in the applicable Specification and Minimum Sampling and Testing Requirements.

1011.5 Material Acceptance Decision Based on Sampling and Testing

UDOT allows two options for obtaining sampling and testing results used in the acceptance decision:

Option 1 – Traditional acceptance is conducted by UDOT personnel according to the Minimum Sampling and Testing Requirements (MS&TR) and project specifications. Sampling and testing activities are validated by independent assurance (IA) activities (MOI Section 1012).

Option 2 – Non-traditional acceptance uses Contractor / Supplier quality control (QC) sampling and testing as part of the acceptance decision when material quality is validated by UDOT through testing and statistical verification.

In both options a qualified third party may be authorized to perform sampling and testing responsibilities for UDOT, the contractor / supplier, or both.

Option 1 —Traditional Acceptance

The contractor is responsible for the quality of material, the quality of the workmanship and the management of the work.

Acceptance sampling and testing is performed by UDOT personnel in Department owned and operated testing facilities or by a UDOT designated agent in a UDOT qualified testing facility. Acceptance testing is performed in accordance with the MS&TR and project specification by qualified technicians.

1011.5.1 Independent Assurance (IA) Activities

IA sampling and testing is performed by UDOT qualified laboratory personnel or a UDOT designated agent in qualified testing laboratories, in accordance with MOI 1012.

Option 2 — Non-traditional Acceptance

UDOT may include QC test results in the acceptance decision. This allows using all available test results for the best statistical evaluation of acceptance properties. QC test results are used in the acceptance decision only when UDOT's verification sampling and testing and IA programs validate the results. UDOT compares the test results statistically, which indicates whether the results contained in each set of data are consistent.

Note: Consistency is not accuracy, but an indication that the testing and sampling procedures produce similar results. If the results are consistent then UDOT can use the QC results with assurance that UDOT would have obtained similar results.

1011.5.2 Quality Control Plan

The QC test results can be used in the acceptance decision only when an acceptable Quality Control Plan (QCP) is used. Contract specifications outline the minimum QCP requirements. The Resident Engineer (RE) must approve the QCP. A simple example of a QC plan and its requirements are illustrated in Appendix B of this chapter.

1011.5.3 Verification Testing

When comparing UDOT and contractor test results, UDOT can either use the test results from a split sample or from samples that were independently obtained. This decision depends upon what material attribute or acceptance activity UDOT is trying to validate and whether UDOT wants to use the test results as part of the acceptance decision.

- If UDOT's objective is to compare the overall sampling and testing process, then verification testing should be done on **independent samples**.
- If UDOT's objective is to compare testing procedures or equipment, verification testing should be done on **a split sample**.

1011.5.3.1 Independent Samples

Samples taken independently of the QC samples can be used for verification of the QC results, or combined with the QC results for acceptance purposes, or both. If the two sets of test results are shown to be statistically consistent, then UDOT's test results may be combined with the QC test results and used in the acceptance decision.

1011.5.3.2 Split Sample

The results of multiple parties conducting tests on a single sample (split sample) are used for validation of test procedures and equipment. Multiple test results of a single sample may not be used in the acceptance decision but are used to verify results used in the acceptance decision.

UDOT's qualified representative witnesses and/or assists in obtaining the sample and takes immediate possession of one portion of the split sample to ensure the validity of the results. If a split of a sample is to be stored, the split sample is sealed with a signed and dated sticker by both the contractor and UDOT inspectors. Disturbed or damaged samples are not to be used in any dispute resolution process.

1011.5.4 Initial Validation

Initial validation of the QC test results are determined using the paired-t test with a level of significance of $\alpha = 0.01$. The paired-t test is used during material production start-up and continues until UDOT has acceptable confidence in the QC testing program. See Appendix C in this chapter for a detailed explanation of the paired-t test concept.

Until the initial validation testing has been done, only UDOT's results can be used in the acceptance decision. UDOT can reduce its testing frequency and use QC results once an acceptable confidence level has been reached.

1011.5.5 Continuing Validation

The QC program and test results are validated continually over the course of material production using statistical analysis of the test results and the IA program for personnel, equipment, test procedures and laboratories.

Continuing validation of QC test results and UDOT's verification test results is accomplished by the F-test and t-test with a level of significance of $\alpha = 0.01$. The F-test and t-test are used once acceptable populations of QC and Verification test results are established and the statistical analysis, using the paired-t test, is validated. The F-test and t-test is used until material production ends or the statistical analysis indicates that there is a problem with either population of test results, in which case UDOT initiates an investigation and resumes paired-t test evaluation until confidence in the contractor's QC testing program is restored. See Appendix D in this chapter for a detailed explanation of the F-test and t-test concepts.

1011.5.6 Non-validation

If comparison of test results indicates that the test results cannot be assumed to be similar, **the reason for the difference in the results should be investigated using dispute resolution procedures identified in project documents for the material in question.**

If the QC sampling and testing procedures or equipment were not in accordance with the contract requirements then the results should not be used in the acceptance decision. UDOT bases the acceptance decision on UDOT test results and additional testing if necessary. If UDOT's sampling and testing procedures or equipment caused the difference then UDOT takes additional tests to compare with the QC initial test results. **If this is not possible, the acceptance decision may be based on the QC test results, provided that previous validation comparisons indicates consistent results between UDOT and QC testing.**

1011.5.7 Testing Frequencies

Sampling and testing frequencies and definitions of lot size for quality assurance, quality control, and verification testing can be found in the Minimum Sampling and Testing Requirements and contract specifications.

1011.5.8 Risk Analysis

When data is not validated through F-test and t-test, a risk analysis is used to evaluate the material. Two acceptable methods for analyzing data are:

- **Qualitative Risk Analysis –** This method is a statistical analysis using QC results and Department independent results, comparing percent within limits with confidence levels defined in Table 1. Data showing acceptable risk levels can be used for pay determination.
- **Qualitative Economic Risk Approach** – This method compares the relative adjustments of UDOT verification results to QC results. When comparisons yield differences less than $600 for results within specification limits, QC results can be used for pay determination. If comparisons yield differences outside the acceptable risk level or greater than $600 dispute resolution procedures apply.

Note - Risk analysis is limited to 2 lots per project

Table 1.

Structure Type	Acceptable risk level
Pre-stressed Concrete Members and Structural Concrete	97.5 Percent within Limits
Other Materials	95 Percent within Limits

1011.5.9 Dispute Resolution

As per Standard Specifications