NTTA Projects	**Original Issue Date:** 12/11/2009	CRV-01
Resource: Contract Requirements Verification	Revision 1 Issue Date: 08/25/2010	Page 1 of 14
Title: Sampling, Testing and Reporting Requirements		

1.0 PURPOSE

The purpose of this procedure is to describe the sampling, testing and reporting requirements necessary to provide consistency in documenting material testing required by Contract Documents.

2.0 RESPONSIBILITIES

2.1 Laboratory designated Supervisors – Laboratory supervisors are responsible for assigning competent personnel, as evidenced by current certifications, to perform sampling and testing and data entry into the EDMS; reviewing and signing all completed testing forms; and providing technical review of test data and results through the EDMS workflow. In addition, Laboratory Supervisors are responsible for alerting the Contractor and Construction Management personnel immediately upon failing material test results.

2.2 Sampling and Testing Technicians – Technicians are responsible for determination of the random locations of samples and tests in accordance with the project specific random sampling procedure if one exists ,or by applying randomness as defined in the NTTA Construction Manual, Appendix C, Guide Schedule of Sampling and Testing, or by using random number tables when directed in writing by NTTA ; performing sampling and testing in accordance with established test procedures referenced within the contract; identifying samples or tests; and documenting sampling and testing results in the NTTA provided sampling and testing forms listed in Section 9.0. In addition, Technicians are responsible for alerting Laboratory Supervisors, Contractors, and potentially Construction Management personnel immediately upon failing material test results.

2.3 Data Entry Personnel - Data entry personnel are responsible for entering data into EDMS from the sample and test forms provided by the technicians.

2.4 Laboratory Engineers – Laboratory engineers are responsible for authorizing test reports through the EDMS workflow and forwarding, through the EDMS workflow, test reports that deviate from the specification requirements but have been accepted by Construction Manager and/or NTTA Engineer based on engineering judgment .

2.5 Construction Manager – Construction Manager is responsible for authorizing, through the EDMS workflow, the test reports forwarded to him/her by the Laboratory Engineers based on engineering judgment in accordance with the Construction Manager Acceptance Decision Delegation, QM-09-A4 authorized by NTTA, and forwarding test reports to the NTTA Engineer for NTTA Engineer's acceptance decision, under conditions when the acceptance decision by the Construction Manager is not authorized. Accordingly when failing material tests occur such that specifications do not allow additional provisions to rectify, the Construction Manager shall generate an NCR in accordance with QM-09.

2.6 NTTA Engineer – – this professional engineer designated by NTTA is responsible for making final acceptance decisions on materials or work deviating from specification requirements, when the deviation is beyond the Construction Manager Acceptance Delegation authorized by NTTA, in accordance with QM-09-A4.

3.0 SCOPE/APPLICABILITY

This procedure shall apply to those NTTA construction projects, executed in the Project Delivery department, when Contractor-performed Project Test results are to be considered in the NTTA Acceptance Decision, and to any other NTTA Construction Projects when contractually specified or otherwise directed in writing by NTTA. It applies to all laboratories and personnel performing sampling and testing during construction that is considered for use in NTTA's Acceptance Decision on these applicable projects.

4.0 REFERENCES

- TxDOT Manual of Testing Procedures
- Contract Documents
- NTTA Construction Manual, Appendix **C, Guide Schedule of Sampling and Testing**
- CRV-01-A1 Sample and Test Identification System
- CRV-02 Random Number Table-Based Random Sampling Requirements
- QM-09 NCR Control of Nonconforming Product - Construction
- QM-09-A3 Guiding Principles for Construction Management Acceptance Decision Delegation
- QM-09-A4 Construction Manager Acceptance Decision Delegation
- QM-09-A5 Contractor Performed Material Testing Disposition Protocol

5.0 DEFINITIONS & ACRONYMS

5.1 Acceptance Decision –NTTA's decision to accept the work based on the results and effective implementation of the Quality Assurance Program approved for the project.

5.2 Acceptance Program – all factors that comprise the NTTA's program to determine quality of the product as specified in the contract requirements.

5.3 CFR – Code of Federal Regulations

5.4 Construction Manager (CM) – NTTA's designated representative responsible for the management of the construction, cost, time, quality, contract administration, and monitoring the Contractor and/or Design-Build entity's performance to its contractual obligations.

5.5 Construction Manager Acceptance Decision Delegation – the authority and guiding principles delegated by NTTA to the Construction Manager for the use of engineering judgment in acceptance of material or work not meeting specification requirements, documented within QM-09-A3 and QM-09-A4.

5.6 Contract Documents – documents related to a specific project by contract between the NTTA and a Contractor or Design-Build entity.

5.7 Contractor – legal entity entering into an agreement/contract with NTTA through the Design-Bid-Build or Design-Build project delivery methods.

5.8 CVL, Controlled Vocabulary List – shall mean the list of agreed-upon nomenclature used to uniquely identify each testing report generated by Contractor performed or OV sampling and testing activities.

5.9 EDMS, Electronic Data Management System – system to electronically store material test results and data, documents and/or images for retention, communication, and/or analysis.

5.10 Fixed Samples - Fixed samples are defined as those samples selected in order to verify or validate an area of suspicious quality and/or those samples selected at locations pre-determined by using patterned sampling routines. These fixed samples shall not be used to fulfill the NTTA Construction Manual, Appendix C, Guide Schedule of Sampling and Testing but rather will be over and above the quantity and frequency of testing required by said Guide Schedule, however this fixed test shall constitute an acceptance test, and a failing result shall be addressed in a manner similar to that of a random test.

5.11 Independent Assurance Program – shall mean all activities that are included in an unbiased and independent evaluation program for all the sampling and testing procedures, personnel, labs, and equipment used as part of the Acceptance Decision.

5.12 Laboratory Engineer – the professional engineers designated by Project testing laboratory and, when OV sampling and testing is required by the Contract Documents, the OV testing laboratory responsible for making acceptance decisions on sampling and testing results based on the requirements of specifications and other Contract Documents.

5.13 Owner Verification (OV) – inspections, observations, auditing, sampling, testing and other activities performed by the NTTA, or performed on behalf of NTTA, to validate or verify the quality of the work.

5.14 Owner Verification Program – document established to define the OV processes and procedures to be implemented by the owner, as part of the Quality Assurance Program.

5.15 Project Tests – the tests listed in the NTTA Construction Manual, Appendix C, Guide Schedule of Sampling and Testing. These tests are described in the table(s) listed there-in for the "Material of Product" indicating the "Test For" using the "Test Number", at the "Location or Time of Sampling", at the "Frequency of Sampling" as listed therein and includes any specific tests required to be performed as prescribed within specifications as part of the Contract Documents.

5.16 Quality Assurance Program (QAP) – the program for quality management and control of the Project and Work, as described in the Contract Documents.

5.17 Quality Control Program (QCP) – program detailing the contractor's internal systematic processes, procedures, and documentation for delivery of quality control and ensure that the Work is delivered in accordance with the Contract Documents.

5.18 Random Samples - Random samples are defined as those samples either selected and documented through the method defined within a project specific random sampling procedure , or selected by applying randomness by avoiding patterned sampling routines, as defined in NTTA Construction Manual, Appendix C Guide Schedule of Sampling and Testing. Random samples also include those samples selected when the next planned random sample is not feasible or practical, i.e. in the case when the use of a random number table selects a sample that does not materialize within the days production and the closest feasible or practical sample must be selected instead.

6.0 PROCEDURE

6.1 For Design-Build projects, or in other situations when the contractor's tests are considered for project acceptance, Random samples must be selected and documented via the method defined in project specific random sampling procedures. However it is important to note that it may also be necessary to include those samples selected when the next planned random sample is not feasible or practical, i.e. in the case when the use of a random number table selects a sample that does not materialize within the days production and the closest feasible or practical sample must be selected instead.

6.1.1 For traditional Design-Bid-Build projects where the sampling and testing performed by the owner or the owner's representative are used for acceptance, Random samples may be selected through applying randomness by avoiding fixed patterns, as defined in the NTTA Construction Manual, Appendix C, Guide Schedule of Sampling and Testing, or by using Random Number Tables when directed in writing by NTTA.

6.2 Personnel Assignment

6.2.1 A Laboratory designated Supervisor assigns sampling and testing technicians meeting the requirements of TxDOT or NTTA's Independent Assurance Program to perform sampling and testing.

6.3 Identify Sample and Test - Sampling and Testing Technicians shall:

6.3.1 Follow the project-specific random sampling procedures if they exist or, apply randomness by avoiding patterned sampling routines as defined in NTTA Construction Manual, Appendix C, Guide Schedule of Sampling and Testing, or use Random Number Tables when directed in writing by NTTA to determine the random sample or test location. Note, said guide schedule shall be fulfilled with **Random** samples. Any **Fixed** samples used to test an area of suspect materials or construction shall be above and beyond said guide schedule compliance.

6.3.2 Select the fixed sample or test location through visual observation, based on sampling or testing personnel's judgment, and/or based on a patterned sampling routine.

6.3.3 Identify the random sample or test independently performed by a testing entity as the Random-Independent (RI) sample or test.

6.3.4 Identify the fixed sample or test independently performed by a testing entity as the Fixed-Independent (FI) sample or test.

6.3.5 Identify the random sample or test performed as a split between two testing entities as the Random-Split (RS) sample or test.

6.3.6 Identify the fixed sample or test performed as a split between two testing entities as the Fixed-Split (FS) sample or test.

6.3.7 Identify the sample or test performed for the purpose of internal review, training, calibration check, proficiency testing, etc. as the Internal sample or test.

6.3.8 Perform field, source, or stockpile sampling.

A) Perform the sampling in accordance with the corresponding sampling procedure, as defined by contract documents.

B) Complete a Sample Identification Form using the established CVL and follow the directions provided in CRV-01-1A, "Sample and Test Identification System" to populate the required fields with sample information.

C) Deliver the sample, together with the complete Sample Identification Form, to the laboratory for processing and testing.

6.3.9 Perform field testing.

A) Use the established CVL and follow the directions provided in CRV-01-1A, "Sample and Test Identification System" to identify the field test and populate the field test information in the applicable field testing forms as listed in Section 9.0 "Component Documents".

B) Perform field tests in accordance with the required test procedures.

C) If a field test fails, immediately notify the lab supervisor and the designated quality representative(s) of the Contractor of the failed test results.

D) If the materials or work represented by the failing test is accepted by the Construction Manager, or his or her authorized designee, such as a Resident Engineer, by the use of engineering

judgment in accordance with Construction Manager Acceptance Decision Delegation authorized by NTTA, QM-09-A4, document Construction Manager's acceptance decision, along with basis for same within the field test form.

E) If the materials or work represented by the failing test is rejected by the Construction Manager, when specifications do not allow any additional provisions to rectify, the Construction Manager shall create an NCR in accordance with QM-09.

6.4 Perform Laboratory Testing – Testing Technicians perform test on material in accordance with the required test procedure.

6.4.1 Process the sample delivered to the laboratory.

6.4.2 The lab supervisor shall assign the laboratory technicians who meet the requirements of the Independent Assurance Program described in the project Quality Assurance Program to perform laboratory testing.

6.4.3 The assigned technician shall perform the assigned laboratory tests in accordance with the required test procedures.

6.4.4 If a laboratory test fails, immediately notify the lab supervisor, and the designated quality representative(s) of the Contractor of the failed test results.

6.4.5 If the materials or work represented by the failing test is accepted by the Construction Manager, or his or her authorized designee, such as a Resident Engineer, by the use of engineering judgment in accordance with the Construction Manager Acceptance Decision Delegation authorized by NTTA, QM-09-A4, document Construction Manager's acceptance decision, along with basis for same within the laboratory test form.

6.4.6 If the materials or work represented by the failing test is rejected by the Construction Manager, when specifications do not allow any additional provisions to rectify, the Construction Manager shall create an NCR in accordance with QM-09.

6.5 Document Test Data and Results – The Testing Technician shall:

6.5.1 Record test data and results on the appropriate form listed in Section 9.0 "Component Documents" for the test performed.

6.5.2 Upon completing each test, review the test data, calculations, and results

6.5.3 Sign and date the completed worksheet and submit the completed worksheet to the designated supervisor.

6.6 Supervisor Review and Approval – The Laboratory designated Supervisor shall:

6.6.1 Review the completed test worksheet for completeness and accuracy of recorded data and CVL, compliance with material testing procedure, and comparison of the test results with the specification requirements. If errors are found, confer with the Testing Technician to determine correct data and have errors corrected on the form.

6.6.2 If errors are found, have the technician correct the form content.

6.6.3 Sign and date the completed form and give to data entry personnel.

6.7 EDMS Data Entry and Review

6.7.1 A data entry person shall use the supervisor approved test data located on the form, and enter all required data into the EDMS.

6.8 EDMS Test Report Technical Review - the Laboratory designated Supervisor shall:

6.8.1 Perform quality control review of the test data entered into the EDMS for completeness and accuracy, against the data entered on the form(s).

6.8.2 When errors are found, send the record with inaccurate or incomplete information through the EDMS correction workflow with comments necessary to accomplish the correction.

6.8.3 If no errors are found, perform technical review of sample and test data and results within the EMDS workflow.

6.8.4 If technical errors are found, send records through the EDMS correction workflow with necessary correction comments.

6.8.5 If no errors are found, send the record through the EDMS Engineering Authorization workflow with a workflow comment indicating compliance with specification requirements.

6.9 EDMS Test Report Authorization by Laboratory Engineer

6.9.1 Follow the EDMS workflow to perform an engineering review of test data and results.

6.9.2 Authorize the test report as pass or fail and close the EDMS workflow.

6.9.3 If a field or laboratory test deviates from the specification requirements but the work or materials represented by the test have been accepted by the Resident Engineer or Construction Manager by the use of engineering judgment, in accordance with Construction Manager Acceptance Decision Delegation authorized by NTTA, QM-09-A4, or the failing test result has been accepted by the NTTA Engineer, forward the test report to the Construction Manager through the EDMS workflow.

6.10 EDMS Test Report Authorization by Construction Manager

6.10.1 Follow the EDMS workflow to perform an engineering review of test data and results.

6.10.2 If the CM decides not to accept the test deviating from the spec. requirements by using engineering judgment, authorize the test report with a "Fail" stamp code and close the EDMS workflow, if specifications do not allow any additional provisions to rectify the failing condition, then the Construction Manager shall also create an NCR in EPDS in accordance with QM-09.

6.10.3 If a field or laboratory test deviates from the specification requirements but the work or materials represented by the test have been accepted by the Resident Engineer or Construction Manager by the use of engineering judgment in accordance with the Construction Manager Acceptance Decision Delegation authorized by NTTA, QM-09-A4, document such engineering judgment decisions along with basis for same within the EDMS workflow, authorize the test report using an "Engineer Decision" stamp code, and close the EDMS workflow.

6.10.4 If the test deviating from the specification requirements is subject to the NTTA Engineer's final acceptance decision, forward the test report to the NTTA Engineer through the EDMS workflow.

6.11 EDMS Test Report Authorization by NTTA Engineer

6.11.1 Follow the EDMS workflow to perform an engineering review of test data and results.

6.11.2 If the NTTA Engineer decides not to accept the test deviating from contract requirements by using engineering judgment, authorize the test with a "Fail" stamp code and close the EDMS workflow, if specifications do not allow any additional provisions to rectify the failing condition, then the NTTA Engineer shall request the Construction Manager to also create an NCR in EPDS in accordance with QM-09.

6.11.3 If a field or laboratory test deviates from the specification requirements but the work or materials represented by the test have been accepted by the NTTA Engineer by the use of engineering judgment authorize the test report using an "Engineer Decision" stamp code, document the basis for the engineer's decision in EDMS workflow, and close the EDMS workflow.

6.12 Nonconformance Management by Construction Manager

6.12.1 All tests authorized with "Fail" stamp code are automatically captured and compiled into the Failing Test Logs within the EDMS.

6.12.2 Initiate, process and close, within EPDS, NCR's for failing tests in which specifications do not allow any additional provisions to rectify in accordance with QM-09, *NCR Control of Nonconforming Product – Construction.*

6.12.3 Upon the NCR closure, change the status of the failing test report from "Pending" to "Closed" in the EDMS Failing Test Logs.

7.0 REGULATORY REQUIREMENTS

Code of Federal Regulations 23 CRF 637(B)

FHWA Technical Advisory T6120.3

8.0 RELATED BOARD POLICY

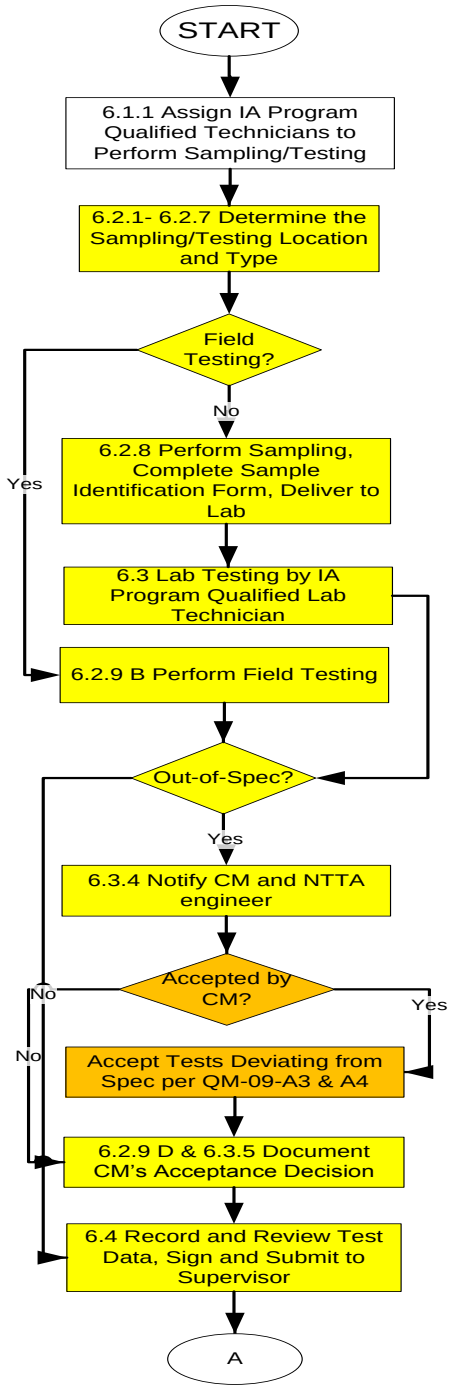
N/A

9.0 COMPONENT DOCUMENTS

CRV-02 Random Sampling Requirements
CRV-01-A1 Attachment A Sample and Test Identification System
CRV-01-F1 Sample Identification Form
CRV-01-F2 Determining Moisture Content in Soils (Tex-103-E)
CRV-01-F3 Atterberg Limits and Bar Linear Shrinkage (Tex-104, 105, 106, 107-E)
CRV-01-F4 Particle Size Analysis of Soils and Base Materials (Tex-101, 110, 111-E)
CRV-01-F5 Sieve Analysis of Select Retaining Wall Backfills (Tex-101, 110, 111-E)
CRV-01-F6 Determination of Moisture-Density Relationship (Tex-113, 114-E)
CRV-01-F7 Field Nuclear Density Form (Tex-115-E)
CRV-01-F8 Wet Ball Mill (Tex-116-E)
CRV-01-F9 Triaxial Compression for Soils and Base Materials - Molding & Triaxial Compression (Tex-117-E)
CRV-01-F10 Triaxial Compression of Soils and Base Materials - Molding & Capillary Wetting (Tex-117-E)
CRV-01-F11 Soil pH (Tex-128-E)
CRV-01-F12 Measuring Soil Resistivity (Tex-129-E)
CRV-01-F13 Determining Thickness by Direct Measurement (Tex-140-E)
CRV-01-F14 Sieve Analysis HMA Coarse Aggregates (Tex-200-F)
CRV-01-F15 Sieve Analysis HMA Fine Aggregates, Rap and Mineral Filler (Tex-200-F)
CRV-01-F16 Sieve Analysis Surface Treatment Aggregate (Tex-200-F)
CRV-01-F17 Sand Equivalent Test (Tex-203-F)
CRV-01-F18 Density of Compacted Bituminous Mixtures (Tex-207-F, Parts I &VI)
CRV-01-F19 Decantation Test for HMA Aggregate (Tex-217-F)

CRV-01-F20 Rice Specific Gravity of Bituminous Mixtures (Tex-227-F)
CRV-01-F21 Sieve Analysis of Concrete Coarse Aggregate (Tex-401-A)
CRV-01-F22 Sieve Analysis and Fine Modulus of Concrete Fine Aggregate (Tex-401, 402-A)
CRV-01-F23 Decantation Test for Concrete Aggregate (Tex-406-A)
CRV-01-F24 Organic Impurities in Fine Aggregate for Concrete (Tex-408-A)
CRV-01-F25 Soundness of Aggregate Using Sodium/Magnesium Sulfate (Tex-411-A)
CRV-01-F26 Deleterious Material in Mineral Aggregate (Tex-413-A)
CRV-01-F27 Concrete Sampling and Testing Form
CRV-01-F28 Determining Pavement Thickness by Direct Measurement (Tex-423-A)
CRV-01-F29 Compressive Strength of Concrete Cores (Tex-424-A)
CRV-01-F30 Bridge Deck and Mass Placement Truck Log

10.0_FLOWCHART



Lab Supervisor –
Personnel Assignment

Technician –
Identify Sample and Test

Technician –
Perform Sampling and Complete Sample Identification Form

Technician –
Perform Laboratory Testing

Technician –
Perform Field Testing

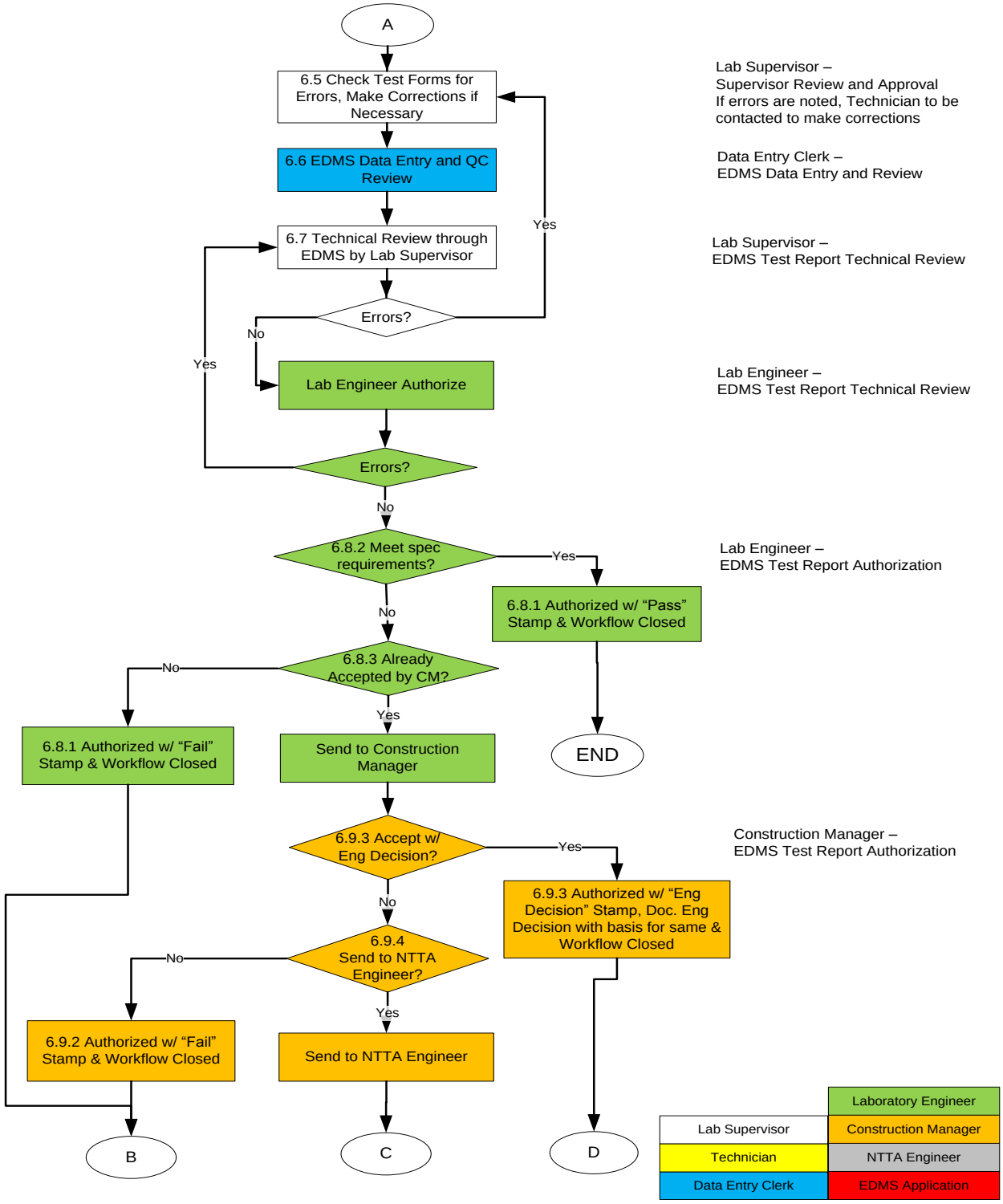
Technician –
Notify CM and NTTA Engineer of Tests Deviating from Spec.

Construction Manager –
Accept Tests Deviating from Spec per QM-09-A3 & A4

Technician –
Document CM's Acceptance Decision along with Name and Time

Technician –
Complete, Review and Submit the Test Forms

	Laboratory Engineer
Lab Supervisor	Construction Manager
Technician	NTTA Engineer
Data Entry Clerk	EDMS Application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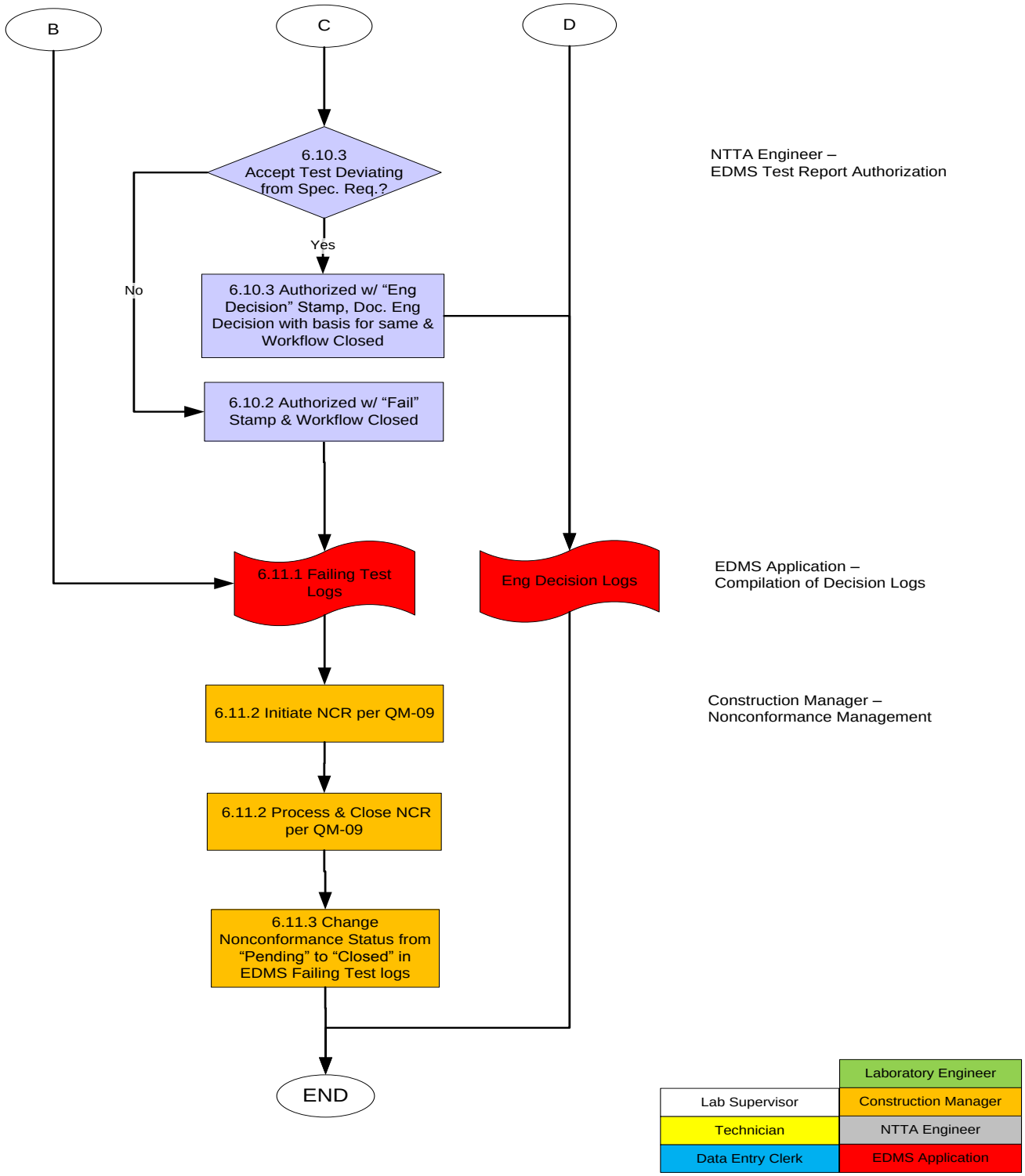
6.5 Check Test Forms for Errors, Make Corrections if Necessary
6.6 EDMS Data Entry and QC Review
6.7 Technical Review through EDMS by Lab Supervisor
Errors?
Yes
No
Lab Engineer Authorize
Errors?
Yes
No
6.8.2 Meet spec requirements?
Yes
No
6.8.1 Authorized w/ "Pass" Stamp & Workflow Closed
6.8.3 Already Accepted by CM?
No
Yes
6.8.1 Authorized w/ "Fail" Stamp & Workflow Closed
Send to Construction Manager
END
6.9.3 Accept w/ Eng Decision?
Yes
No
6.9.3 Authorized w/ "Eng Decision" Stamp, Doc. Eng Decision with basis for same & Workflow Closed
6.9.4 Send to NTTA Engineer?
No
Yes
6.9.2 Authorized w/ "Fail" Stamp & Workflow Closed
Send to NTTA Engineer
B
C
D
Lab Supervisor – Supervisor Review and Approval If errors are noted, Technician to be contacted to make corrections
Data Entry Clerk – EDMS Data Entry and Review
Lab Supervisor – EDMS Test Report Technical Review
Lab Engineer – EDMS Test Report Technical Review
Lab Engineer – EDMS Test Report Authorization
Construction Manager – EDMS Test Report Authorization
Laboratory Engineer
Lab Supervisor
Construction Manager
Technician
NTTA Engineer
Data Entry Clerk
EDMS Application


B
C
D
6.10.3 Accept Test Deviating from Spec. Req.?
Yes
No
6.10.3 Authorized w/ "Eng Decision" Stamp, Doc. Eng Decision with basis for same & Workflow Closed
6.10.2 Authorized w/ "Fail" Stamp & Workflow Closed
6.11.1 Failing Test Logs
Eng Decision Logs
6.11.2 Initiate NCR per QM-09
6.11.2 Process & Close NCR per QM-09
6.11.3 Change Nonconformance Status from "Pending" to "Closed" in EDMS Failing Test logs
END
NTTA Engineer – EDMS Test Report Authorization
EDMS Application – Compilation of Decision Logs
Construction Manager – Nonconformance Management
Laboratory Engineer
Lab Supervisor
Construction Manager
Technician
NTTA Engineer
Data Entry Clerk
EDMS Application

11.0 REVISION HISTORY

Revision	Revised by:	Date Issued	DRN	Reason for Revision
0	John Roberts	12/11/2009	10067	Original Issue
1	Frank Yuan	08/25/2010	10232	Added detail for clarification, added definitions of fixed and random samples, detailed Constr Mgmt requirements related to failing test reports and added linear flowchart.