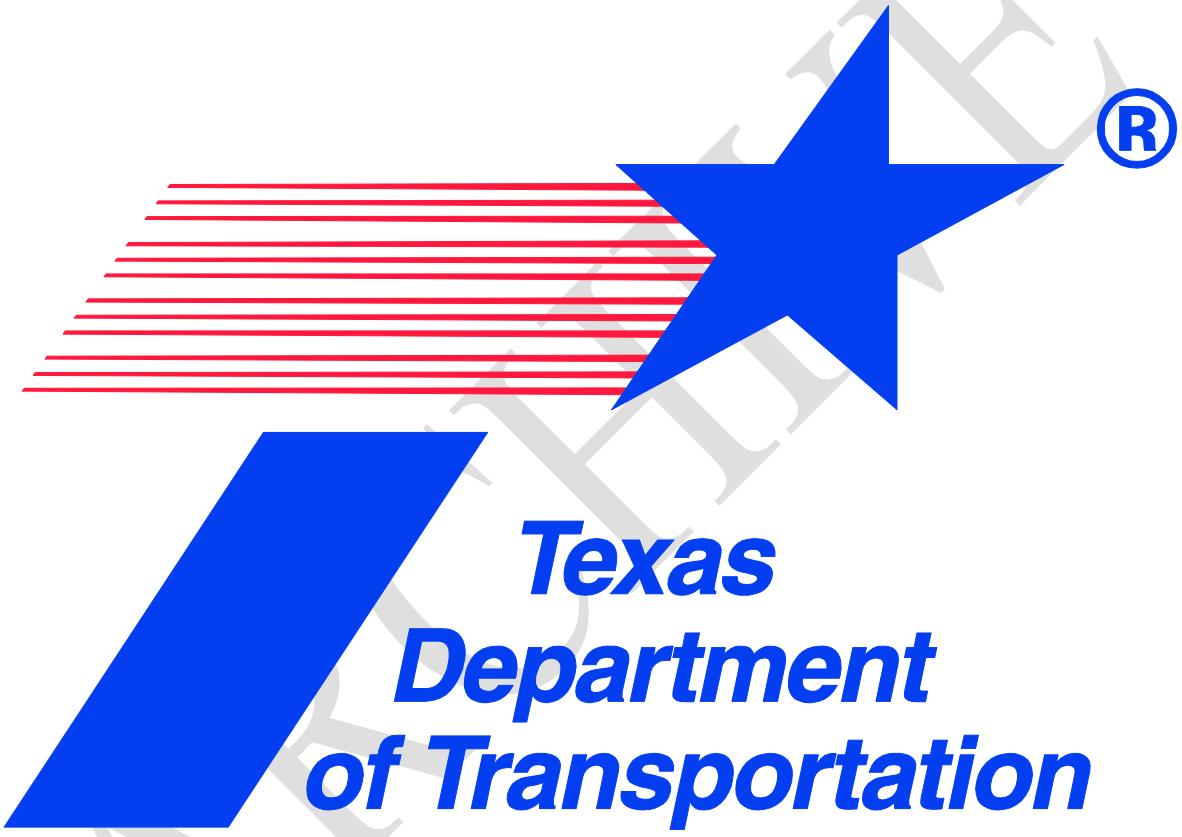
Quality Assurance Program
for
Design-Build Projects with an Optional 15-Year Capital Maintenance Agreement



July 25, 2011–October 25, 2016

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SECTION 1 - INTRODUCTION

1.1 General

The Quality Assurance Program (QAP) for design-build Projects established by the Texas Department of Transportation (TxDOT) ensures that materials and workmanship incorporated into the highway construction project are in reasonable conformance with the approved plans and specifications, including any approved changes.

This program is developed based on 23 CFR 637B and Federal Highway Administration (FHWA) Technical Advisory T6120.3, which are available at the following links:

- 23 CFR 637B - http://www.access.gpo.gov/nara/cfr/waisidx_03/23cfr637_03.html
- TA 6120.3 - http://www.fhwa.dot.gov/legsregs/directives/techadvs/t61203.htm

The program consists of a quality control program, an acceptance program and an independent assurance (IA) Program. The QAP allows for the use of contractor-performed quality acceptance (QA) test results as part of an acceptance decision if the QA results are validated by the Owner Verification (OV) testing results performed by TxDOT.

The purpose of this manual is to provide statewide consistency and a programmatic approach to quality assurance for design-build projects where the contractor's test results are used in the acceptance decision regardless of how the project is funded. It clarifies federal requirements relating to quality assurance and statistical analysis procedures. The content of this program is developed for projects with an optional 15-year maintenance agreement as part of the design-build CDA with no Special Experimental Project 15 (SEP-15) exceptions with respect to quality assurance. This document is to be included (or referenced) in the RFP, CDA and other key preconstruction project documents and approvals by TxDOT and FHWA. Any modification to this QAP requires review and approval by TxDOT and FHWA ninety days prior to construction.

The use of contractor tests results as part of the acceptance decision should be carefully evaluated for each project because a significant TxDOT owner verification program is instrumental to its success.

Acronyms and definitions for terms used in the QAP are provided in Appendix A – Acronyms and Definitions.

The QAP is comprised of several components and the relationships between the parties and functions are shown in Figure 1.

Figure 1 – Components and Relationship in the QAP

1.2 Construction Quality Management Plan

Developer's Construction Quality Management Plan (CQMP) shall consist of both quality control (QC) and QA with respect to performance of the Work. Requirements for the QC portion of the CQMP are described in Section 2 – Quality Control Program. Requirements for the QA portion of the CQMP are described in Section 3 – Acceptance Program. The CQMP shall establish a clear distinction between QC and QA activities and the persons performing each function. Developer shall submit the CQMP to TxDOT for review and approval.

1.3 Owner Verification Testing and Inspection Plan

TxDOT's Owner Verification Testing and Inspection Plan (OVTIP) shall describe TxDOT's commitments to perform owner verification (OV) of the Developer's QA testing and inspection. Requirements for the OVTIP are described in Section 3 – Acceptance Program.

1.4 Conflict of Interest

To avoid an appearance of a conflict of interest, any qualified laboratory shall perform only one of the following types of testing on the same project:

A. Quality control testing;
B. Quality acceptance testing;
C. Owner verification testing;
D. Independent assurance testing; or
E. Referee testing.

SECTION 2 - QUALITY CONTROL PROGRAM

2.1 General

Developer shall be responsible for the quality of the Work. Project quality will be enhanced through the daily efforts of all the workers involved with the Work, supported by Developer's CQMP. Developer's QC portion of the CQMP shall include the internal procedures used by Developer that will ensure that the Work is delivered in accordance with the released-for-construction plans, approved shop drawings, working drawings, and specifications. This involves the active participation of the entire work force in working to achieve "quality" initially and to minimize/eliminate re-work. Developer's QC shall not be part of the acceptance program.

2.2 Developer Quality Control Requirements

Developer's CQMP shall establish a systematic approach to define the processes, methods, procedures, and documentation for delivery of QC on the Project. These methods and procedures shall clearly define the authority and responsibility for the administration of Developer's QC plan.

2.2.1 Staffing

Developer shall assign an on-site Construction Quality Control Manager (CQCM) who shall be responsible for management of the quality control aspect of the CQMP. The CQCM shall not be involved with scheduling or production activities, and shall report directly to Developer's management team. The CQCM shall see that the methods and procedures contained in the approved CQMP are implemented and followed by Developer and Subcontractors in the performance of the Work. The CQCM shall be a Registered Professional Engineer.

Developer's and Subcontractors' construction work force are all considered to be members of Developer's quality control staff as each and everyone is responsible for the quality of the Work. Personnel responsible for performing the quality control inspection shall be knowledgeable and receive training to perform their quality control duties. Personnel performing quality control sampling and testing shall be knowledgeable in the testing methods and procedures.

Although not used for acceptance, QC testing and inspection shall ensure quality has been incorporated into all elements of work prior to requesting acceptance testing and inspection. The QC program should be sufficient in scope to remedy repeated discoveries of non-compliant work by those performing acceptance inspection and testing. Repeated observations of QC quality shortfalls shall be considered a breakdown of the QC program and shall be cause for investigation and corrective action prior to commencement of work areas affected. Corrective action may include the addition of new QC procedures, revision to existing QC procedures, re-training of QC personnel, removal and replacement of QC personnel, or other such actions which will restore the effectiveness of the QC program.

2.2.2 CQMP Requirements

Developer's CQMP shall clearly address, at the minimum, how the Developer's QC staff will address the following requirements:

A. A construction quality control organizational chart and staffing plan, which shall include the period of time that the QC staff members will be present on the site and the experience/knowledge/skill levels of QC staff.

B. Procedures to ensure that the education, training, and Qualification of personnel performing CQMP activities are achieved and maintained and that all Work is performed in accordance with the approved designs, plans, and specifications.

C. Procedures to ensure that Developer, Suppliers, and Subcontractors designate individuals on each crew responsible for performing daily field inspections of their own Work and for preparing a daily QC report to document the inspection performed. Report forms to be used by the responsible quality control personnel shall be included in the Developer's CQMP.

D. Documents specifying that all activities undertaken by or on behalf of Developer affecting the quality of the Work shall be prescribed and accomplished by documented instructions, procedures, and appropriate drawings. Such instructions, procedures and drawings shall include quantitative and qualitative criteria to be used to determine compliance.

E. Procedures to ensure that critical elements of the Work are not started or continued without QA personnel on site for acceptance inspection and testing. Inspection or hold points shall be identified and communicated to the CQAF, CQCM, and TxDOT. Procedures to proceed beyond inspection or hold points shall be developed.

F. Procedures for inspecting, checking, and documenting the Work. Inspection, examinations and measurements shall be performed for each operation of the Work to assure quality.

G. Procedures for identification and control of materials, equipment, and elements of the Work. These procedures shall ensure that identification of an item is maintained by appropriate means, either on the item or on records traceable to the item, as necessary, throughout fabrication, erection, installation and use of the item.

H. Procedures to ensure that materials, equipment or elements of the Work that do not conform to requirements of the CDA Documents, the Governmental Approvals, applicable Law or the Design Documents are not used or installed. These procedures shall include identification, documentation, segregation, disposition and notification to TxDOT and, if appropriate, Governmental Entities and other affected third parties, as well as procedures for TxDOT to review Nonconforming Work.

I. Procedures for processing a request for information (RFI) to resolve discrepancies and/or questions in the plans and specifications so that all changes are documented and approved by Developer's design engineers and TxDOT.

J. Procedures to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the Work.

K. A program for coordination of all CQAF inspections and testing with Governmental Entities and Utility Owners.

L. A program to ensure performance of all testing required to demonstrate that all materials, equipment and elements of the Work will perform satisfactorily for the purpose intended and meet the standards specified in the CDA Documents. It shall specify written test procedures which include provisions for ensuring that all prerequisites for the given test have been met and that adequate test instrumentation is available and used. The CQMP shall require test results be documented and evaluated by the CQCM to ensure that test requirements have been satisfied.

M. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified and adjusted at specified periods to maintain accuracy within industry standards.

N. The preparation of all Portland cement concrete, soil-lime treatment, soil-cement treatment, and hot mix asphaltic concrete mix designs by personnel who hold the required certifications as specified in the CDA Documents. Additionally, the designs shall be reviewed and sealed by a Registered Professional Engineer attesting that the design meets TxDOT requirements for the specified class or grade for which it was prepared.

O. Sampling and testing of all materials during the production or manufacturing processes so that only materials meeting the specifications are supplied for ultimate incorporation into the Work.

P. Procedures to control the handling, storage, shipping, cleaning and preservation of materials and equipment to prevent damage or deterioration.

Q. Procedures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, defective material and equipment, deviations and other Nonconforming Work are promptly identified and corrected. The procedures shall ensure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition and the corrective action taken shall be documented and reported in writing to TxDOT and to appropriate levels of Developer's management to ensure corrective action is promptly taken.

R. Measures to control the receipt and issuance of documents, such as instructions, procedures, training manuals and drawings, including changes thereto, which prescribe activities affecting quality. These measures shall ensure that approved documents, including authorized changes thereto, are reviewed for adequacy and approved for release by authorized personnel of Developer and are distributed to and used at the location where the prescribed activity is performed. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless TxDOT consents, in writing, to another responsible organization.

S. Requirements and methods for controlling documents.

T. Procedures for checking and verifying the accuracy and adequacy of construction stakes, lines, and grades established by the Developer.

U. Procedures for ensuring that construction alignment and grades are in accordance with the requirements contained in the current TxDOT Survey Guide.

2.2.3 Reporting, Record Keeping, and Documentation

Developer shall maintain construction workmanship and materials quality records of all inspections and tests performed per the approved CQMP. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken. These records shall cover both conforming and defective or deficient features, and shall include a statement that all supplies and materials incorporated in the Work are in full compliance with the terms of the CDA Documents. These records shall be furnished to TxDOT in format and content as specified in the CQMP.

Quality control inspection reports and process control material sampling/testing results, and control charts shall be updated within forty-eight (48) hours following the inspection or test and readily available for CQAF and TxDOT review or audit.

SECTION 3 - ACCEPTANCE PROGRAM

3.1 General

There are two types of acceptance on design-build projects. The first type of acceptance is TxDOT-performed acceptance where frontline acceptance testing and inspection are performed by TxDOT. The second type of acceptance is contractor-performed acceptance where frontline acceptance testing and inspection are performed by the Developer's CQAF.

Under TxDOT-performed acceptance, only TxDOT's testing and inspection results are used in the acceptance decision. Under contractor-performed acceptance, OV and QA together are the basis for the acceptance decision. Contractor-performed QA results may be used for acceptance when they are statistically validated and/or verified by the OV results. QA is performed by the Developer and the OV is performed by TxDOT.

Developer's QA portion of the CQMP shall include the internal procedures used by the Developer's CQAF to ensure that the Work is inspected and tested to verify compliance with the released-for-construction plans, approved shop drawings, working drawings, and specifications. Developer's QA shall be separate from the Developer's QC program. TxDOT's OV program shall include internal procedures used by TxDOT to ensure that Developer's frontline acceptance is performed in accordance with the approved CQMP and to verify QA testing and inspection.

3.1.1 TxDOT-Performed Acceptance

TxDOT will perform acceptance testing as part of its Quality Monitoring Program (QMP). The CQAF shall perform job control tests (as defined by the TxDOT Guide Schedule of Sampling and Testing) on materials listed on the Aggregate Quality Monitoring Program (AQMP). Materials which are not monitored or not pre-approved by TxDOT under the QMP are subject to QA and OV sampling and testing as part of contractor-performed acceptance.

Under the QMP, Developer shall furnish to TxDOT samples of materials to be incorporated into the Work at TxDOT's request. Manufacturers' warranties, guarantees, instruction sheets, parts lists and other materials that are furnished with articles or materials incorporated into the Work shall be made available to TxDOT upon request.

TxDOT Services. TxDOT may perform the inspection and testing at all approved steel structure fabrication plants, pipe manufacturing plants, commercial precast prestressed and non-stressed concrete products plants and any job site prestressed concrete plants.

As may be requested by the Developer and agreed upon by TxDOT, the cooperative use of TxDOT resources for materials testing and inspection services at a point in Texas where the State routinely provides resident inspection services for its own highway materials, and at other location throughout the contiguous United States, will be accepted by the Developer. Upon election by the Developer to use TxDOT services, the Developer shall prepare work orders in full compliance with the terms of the CDA Documents.

3.1.2 Contractor-Performed Acceptance

Under contractor-performed acceptance, both the QA and OV testing make up the acceptance decision. Section 3.2 – Sampling and Testing describes sampling and testing requirements for both the QA and OV groups. Section 3.3 - Developer Quality Acceptance Requirements describes materials acceptance specific to QA requirements and Section 3.4 – Owner Verification Requirements describes owner verification testing, statistical analysis, and reporting requirements specific to OV requirements.

3.2 Sampling and Testing

This section provides FHWA and TxDOT's guidance on sampling, testing, inspection, and acceptance requirements to be used in the acceptance decision.

3.2.1 Sample Types and Uses

Sampling is either random or fixed, depending on whether the location was selected randomly (random) or if a specific location was subjectively identified (fixed). Sampling is also either independent or dependent, based on whether the location was independently selected (independent) or whether is based on the location of another sample (dependent/split). The F- and t- tests described in Section 3.4.3 – FHWA Reporting are only valid when using random independent samples.

However, split samples may be used outside of the statistical analysis for owner verification of contractor-performed acceptance tests under TxDOT's Owner Verification Program. A comparison process for performing and analyzing split samples between TxDOT and CQAF is necessary during the initial implementation of the QAP. These samples will be analyzed by TxDOT and the results discussed with the CQAF to assure laboratory and technician test results compare favorably. When the acceptable tolerance limits in Appendix B – Split Sample Tolerance Limits are exceeded, corrective actions for either or both parties will be identified and corrective actions will be incorporated as appropriate. This process will help provide initial alignment of the TxDOT and CQAF laboratories and testing procedures.

Split samples may also be performed throughout the life of the project as necessary to investigate non-validating material categories and verify or realign testing equipment and personnel.

3.2.2 Notification

The Developer shall, on a weekly basis, provide the CQAF and TxDOT with a three-week look-ahead schedule of planned activities. The Developer shall also, on a daily basis, communicate changes to the scheduled work, for each current day to the CQAF and TxDOT, and shall notify the CQAF and TxDOT when materials are ready for sampling and testing.

3.2.3 Quantities and Testing Frequency

The CQAF shall continuously track and record the quantity of material incorporated into the Project. This report shall be generated weekly to ensure CQAF compliance with TxDOT's Guide Schedule of Sampling and Testing. TxDOT shall use the report to verify compliance of both the QA and OV testing frequency.

The CQAF shall perform material sampling at locations and timing defined in TxDOT's Guide Schedule of Sampling and Testing. At a minimum, material sampling and testing shall be conducted at the frequency of sampling specified in TxDOT's Guide Schedule of Sampling and Testing. This minimum testing frequency

must be met with random independent samples as defined in Section 3.2 – Sampling and Testing. During the start-up of new categories of work and when there are any concerns over the quality of material, the CQAF shall conduct testing at a higher testing frequency as described in the preamble of TxDOT's Guide Schedule of Sampling and Testing.

While the testing of random independent samples are required to meet the guide schedule testing requirements, the CQAF shall perform additional (fixed) tests when the quality of material is questionable at a location other than the randomly selected location. This fixed test shall constitute an acceptance test and a failing result shall be addressed in a similar manner to a failing random independent test. Fixed tests shall not count towards meeting minimum CQAF testing frequencies.

TxDOT, or their designee, will perform oversight inspection and material verification sampling/testing. To verify QA test results, OV testing shall be performed at a frequency shown in Appendix D – OVT Levels for Materials Testing Validation subject to project-specific recommendations to be approved by TxDOT CSTM&P. OV testing frequency shall be established at TxDOT's sole discretion. Split sample testing defined in Appendix F does not replace or relieve the requirements found in Section 4.0 – Independent Assurance Program.

3.3 Developer Quality Acceptance Requirements

Developer's CQMP shall establish a systematic approach to define the processes, methods, procedures, and documentation for delivery of QA on the Project. These methods and procedures shall clearly define the authority and responsibility for the administration of Developer's QA plan.

3.3.1 Staffing

Developer's CQAF shall assign an on-site Construction Quality Acceptance Manager (CQAM) who shall be responsible for management of the quality acceptance aspect of the CQMP. The CQAM shall be a Registered Professional Engineer and shall be an employee of the CQAF. The CQAM shall report jointly to Developer's management team and TxDOT. The CQAM shall not report to any person or party directly responsible for design or construction production.

The CQAM shall review, approve, authorize, examine, interpret and confirm any methods or procedures requiring the "Engineers' review, approval, authorization, examination, interpretation, confirmation, etc." which are contained in the TxDOT Standard Specifications.

A quality acceptance inspection and material sampling/testing staff shall be provided under the direction of the CQAM to perform inspection and material sampling/testing of all Work performed and materials incorporated into the Project by any member of Developer's group. If approved in writing in advance by TxDOT, qualified individuals who are employees of or retained by manufacturers, Vendors or Suppliers may inspect certain portions of Work.

The quality acceptance inspection staff shall be employees of the CQAF and shall have been trained in the applicable inspection and material sampling and testing procedures. The quality acceptance staff shall be experienced in highway inspection and material testing. The training and experience of the quality acceptance staff shall be commensurate with the scope, complexity, and nature of the activity to be inspected and tested. Qualifications shall include appropriate TxDOT or State Highway Agency certification

for testing and inspection as well as appropriate nationally recognized certifications applicable to inspection or testing activities. CQAF testing personnel must be qualified under the IA program described in Section 4 – Independent Assurance Program. Documentation of the training and certification shall be maintained by the CQAF and available for review and audit.

The size of the CQAF's quality acceptance staff shall reflect the volume of quality acceptance activities necessary for the Work in progress and shall be maintained in accordance with the approved CQMP.

The CQAF's staffing requirements shall be updated as necessary throughout the term of the Work to reflect changes in the actual construction schedule. Developer shall ensure that adequate CQAF staff are available and that CQMP activities are undertaken in a manner consistent with the Project Schedule and in a manner that will enable Developer to achieve the Substantial Completion and Final Acceptance deadlines.

3.3.2 Quality Acceptance Facilities and Equipment

Developer's CQAF shall use a laboratory meeting the requirements described in Section 4 – Independent Assurance Program for acceptance testing. Unless otherwise approved by TxDOT, the laboratory or field laboratory shall be located on site or within ten (10) miles of the Project.

3.3.3 CQMP Requirements

Developer's CQMP shall clearly address, at the minimum, how the Developer's QA staff will address the following requirements:

A. Methods and procedures that clearly define the authority and responsibility for the administration of Developer's CQMP.

B. Procedures for inspecting, checking, and documenting the Work for acceptance. Inspection, examinations and measurements shall be performed for each operation of the Work to assure quality.

C. Procedures to ensure that the education, training, and certification of personnel performing CQMP activities are achieved and maintained and that all Work is performed in accordance with the approved designs, plans, and specifications.

D. Procedures to documenting and tracking the disposition of any identified noncompliance with the plans and specifications. These procedures shall include a clearly defined process for communicating identified non-compliances to TxDOT and the Developer.

E. Measures to ensure that purchased materials, equipment, and services conform to the CDA Documents, the Governmental Approvals, applicable Laws, Rules, and the Design Documents. These measures shall include provisions for source evaluation and selection, objective evidence of quality furnished by Subcontractors and Suppliers, inspection at the manufacture or vendor source, and examination of products upon delivery.

F. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified and adjusted at specified periods to maintain accuracy within industry standards.

G. A comprehensive system of planned and periodic audits of Developer's CQMP to determine adherence to and the effectiveness of the CQMP. CQAF personnel shall perform the audits in accordance with the written procedures or checklists. Audit results shall be documented, reviewed, transmitted to TxDOT, and acted upon by Developer. Follow-up action, including re-audit of deficient areas following corrective action, shall be taken where indicated.

H. The requirements and methods for controlling documents. Developer's document control system shall be compatible with TxDOT's.

I. Inspection of all Work to verify and document that the Work has been constructed in conformance with the released-for-construction plans, specifications, and approved working and shop drawings.

J. Procedures on how quality acceptance material sampling and testing will be performed including the process for generating random test locations, tracking material samples, processing material samples, review and approval of test records, tracking compliance with material testing frequency.

K. Procedures for addressing failed tests. For a failed random independent test, a fixed test at the original failing test location and a new random independent test at a new location in the same lot are required. For a failed fixed test, a new fixed test is required at the original failing test location.

L. Procedures for reviewing QA test results for compliance with mutually agreed-upon processes and naming conventions to ensure data integrity for accurate statistical analyses.

M. Procedures for auditing of QC and QA records, documentation, procedures, and processes to verify compliance with the CDA Documents and approved CQMP.

N. Procedures for the review and approval of all Portland cement concrete, soil-lime treatment, soil-cement treatment, and hot mix asphaltic concrete mix designs by a Registered Professional Engineer. The CQAF shall also verify trial batches.

O. Procedures for ensuring quality acceptance testing shall be performed at the frequency stipulated in the TxDOT's Guide Schedule of Sampling and Testing.

P. Procedures for ensuring quality acceptance staff shall provide oversight and perform audits of the quality control inspection and material sampling/testing operation.

Q. Procedures for ensuring that pre-approved materials used on the project maintain their approved status on the AQMP. Materials which do not maintain AQMP approval shall be sampled and tested on a project-level basis.

3.3.4 Reporting, Record Keeping, and Documentation

The Developer shall document and maintain documentation showing how the CQAF has complied with the CQMP requirements in Section 3.3.3.

The Developer's CQAF shall maintain electronically and transmit to TxDOT daily inspection reports within twenty-four (24) hours after the work shift in a format acceptable to TxDOT. The daily inspection reports shall document the day's events, activities, identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The responsible inspector and supervisor shall sign the daily inspection reports.

The CQAF shall be responsible for establishing an electronic system for recording all material test results. The responsible technician and his/her supervisor shall sign the daily test reports and the results of the daily tests shall be provided to TxDOT within two days of test completion. The CQAF's material test results shall be electronically transmitted to TxDOT in an XML format acceptable to TxDOT. Guidance on TxDOT requirements for XML data transfer is provided in Appendix C – I2MS Data Transfer Requirements. This electronic reporting is intended to allow the Developer and TxDOT to make timely and accurate decisions on workmanship and material quality issues.

The CQAF inspection and material test results shall be simultaneously transmitted to both TxDOT and the Developer. The Developer shall not receive the CQAF inspection or material test results prior to TxDOT.

3.4 Owner Verification Requirements

3.4.1 General

TxDOT has the ultimate responsibility for verifying that the Project is designed and constructed in compliance with the CDA Documents. As such, TxDOT will perform owner verification testing and inspection, and conduct audits to verify the Developer's compliance with the approved CQMP.

TxDOT shall establish a system for managing the materials acceptance process. This process shall include the performance and approval of OV tests at the stipulated test frequency, review of QA test results, performance of statistical analysis on OV and QA test results, and any associated tasks arising out of the statistical analysis.

A project-specific analysis of risks should be performed and recommended changes to Appendix D – OVT Levels for Materials Testing Validation shall be presented to TxDOT CSTM&P for approval.

TxDOT's OV laboratory shall meet the requirements described in Section 4 – Independent Assurance Program.

3.4.2 Owner Verification Testing and Inspection Plan

TxDOT or their designated agent will develop a comprehensive Owner Verification Testing and Inspection Plan (OVTIP) and submit it to TxDOT for approval.

TxDOT's OVTIP shall clearly address, at the minimum, how TxDOT's OV staff will address the following requirements:

A. Methods and procedures that clearly define the authority and responsibility for the administration of OVTIP.

B. Procedures for overseeing and inspecting the Work for compliance with the Developer's CQMP for each operation.

C. Procedures to ensure that the education, training, and certification of personnel performing OV activities are achieved and maintained and that all Work is performed in accordance with the approved OVTIP.

D. Procedures to oversee the status and disposition of any identified noncompliance with the plans and specifications.

E. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified and adjusted at specified periods to maintain accuracy within industry standards.

F. A system of planned and periodic audits of Developer's CQMP to determine adherence to and the effectiveness of the CQMP. Audit results shall be documented, reviewed, sent to TxDOT and the Developer. Follow-up action, including re-audit of deficient areas following corrective action, shall be taken where indicated.

G. A system of planned and periodic audits of the OV firm to determine adherence to and the effectiveness of the OVTIP. Audit results shall be documented, reviewed, sent to TxDOT. Follow-up action, including re-audit of deficient areas following corrective action, shall be taken where indicated.

H. Procedures for performing periodic inspection of Work to verify that the CQAF has performed work in compliance with the released-for-construction plans, specifications, and approved working and shop drawings. The procedure should identify a target oversight inspection rate, methods for performing verification inspections for all QC and CQAF inspectors.

I. Procedures on how OV material sampling and testing will be performed including the process for generating random test locations, tracking material samples, processing material samples, review and approval of test records, tracking compliance with material testing frequency.

J. Procedures for reviewing QA and OV test results for compliance with mutually agreed-upon processes and naming conventions to ensure data integrity for accurate statistical analyses.

K. Procedures for ensuring that only tests performed by qualified CQAF testing personnel are submitted to TxDOT.

L. Procedures for auditing of QC and QA records, documentation, procedures, and processes to verify compliance with the CDA Documents and approved CQMP.

M. Procedures for reviewing Portland cement concrete, soil-lime treatment, soil-cement treatment, and hot mix asphaltic concrete mix designs.

N. Procedures for ensuring OV testing shall be performed at the frequency stipulated in this QAP.

O. Procedures for performing statistical analyses in compliance with procedures outlined in this QAP.

3.4.3 FHWA Reporting

TxDOT will submit periodic reports to FHWA for concurrence with TxDOT's compliance with the approved QAP. Approved reports shall be distributed to the CQAF after receiving FHWA concurrence. The reporting period for specific pay items or materials is dependent on the pace of construction and the number of tests performed in each analysis category, the time period of the sampling, and the specification and quality requirements. Each report shall cover a period of construction not greater than three months.

The FHWA report shall address the following areas.

A. Statistical analysis results, to include specification requirements and status of validation process during start-up and completion of an item;

B. Non-validation investigation;

C. Non-conformance log;

D. Engineering judgment log; and

E. Construction certification

3.4.3.1 Statistical Analysis. F-tests and t-tests will be used to analyze OV and QA data. The F-test is a comparison of variances to determine if the OV and QA population variances are equal. The t-test is a comparison of means to determine if the OV and QA population means are equal. In addition to these two types of analyses, independent verification and observation verification will also be used to validate the QA test results. The type of analysis and recommended level of significance for specific tests are shown in Appendix D – OVT Levels for Materials Testing Validation.

Before performing any statistical analyses, it is important to ensure that the data contained in each analysis categories are in reasonable compliance with the underlying assumptions of the F-test and t- test. The implementation of controlled vocabulary lists (CVLs) is essential to parse data into appropriate analysis categories.

3.4.3.2 Non-Validation Investigation. If the OV test results do not validate the QA test results, an investigation shall be conducted to determine the reason for not verifying. Assuming that the analysis categories were established appropriately, other areas for investigation include data integrity and accuracy, testing equipment and procedures, sampling variability and material variability. Material quality when non-validation occurs is further discussed in Section 3.5 – Dispute Resolution. Results of the investigation should be reported for the non-validating categories.

3.4.3.3 Engineering Judgment Log. Material test results that indicate reasonable conformance with specification requirement, but did not meet the minimum specification requirements, may be adequate for their intended use. As such, TxDOT has allowed the CQAF to exercise Engineering Judgment to accept such material. However, each occurrence has to be properly documented. Documentation shall include the location where the material is incorporated, the specification requirement, the recorded test value, and the Engineering Judgment applied to allow use of that material. If the CQAF does not choose to exercise Engineering Judgment to accept material failing specifications, the material in question may still be accepted through the NCR process, brought into conformance with specifications, or removed from the project.

3.4.3.4 Non-Conformance Log. Materials that do not meet the minimum specification requirements may be adequate for their intended use. However, the incorporation of the material in questions is subject to the review and approval by the design engineer and has to be documented through the Nonconformance Record (NCR) process.

Developer shall identify, document and report to TxDOT all instances of Work that have not been constructed with the strictest adherence to the approved drawings and specifications and with the requirements of the CDA Documents, the Governmental Approvals and applicable Law. This reporting shall

be in the form of an NCR as described below and shall be submitted to TxDOT in writing within twenty-four (24) hours of Developer obtaining knowledge of the same. Developer shall simultaneously send a copy of each NCR to Developer's design engineer and the CQAF.

The NCR shall clearly describe the element of Work that is non-conforming and the reason for the non-conformance. The engineer, who stamped and sealed the drawings for the Work, shall evaluate the effect of the Nonconformance on the performance, safety, durability, and effect of the long-term maintenance of the project and the specific element affected. If the Engineer in Responsible Charge determines remedial actions are necessary, the proposed remedial action shall be documented and bear the stamp of the original responsible Registered Professional Engineer or the responsible Registered Professional Engineer from the same firm assigned to replace the original one.

Developer shall maintain a log of all NCRs and submit this log to TxDOT and the CQAF on a bi-weekly basis. Each NCR shall be numbered sequentially, given a brief description, a status and, if it is not closed, an expected date for closure. All NCRs must be closed with the stamp of Design Firm's qualified engineer in charge and TxDOT approval or the responsible Registered Professional Engineer from the same firm assigned to replace the original one.

3.4.3.5 Construction Certification. The CQAM shall provide a monthly written certification by the CQAM, delivered to TxDOT with each payment request, indicating that the CQMP and all of the measures and procedures provided therein are being fully complied with and are functioning properly. The CQAF shall maintain and submit records monthly that include factual evidence that required activities and tests have been performed, including the following: (i) type, number, and results of CQMP activities, including reviews, inspections, tests, audits, monitoring of Work performance and materials analysis; (ii) related data such as qualifications of personnel, procedures and equipment used; (iii) the inspector or data recorder, the type of test or observation employed, the results and the acceptability of the Work and action taken in connection with deficiencies; (iv) nature of Nonconforming Work and causes for rejection; (v) proposed corrective action for Nonconforming Work; (vi) corrective actions taken with respect to Nonconforming Work; and (vii) results of such corrective actions.

3.5 Dispute Resolution

Through the life of the Project, there may be differences in material test results or statistical sample populations between the CQAF and TxDOT. Due to the natural variability in construction materials testing and unavoidable biases in sampling and testing, these differences are often difficult to avoid. It is important to recognize the difference between material quality and statistical validation.

Material quality is measured by whether a test passes or fails and is an indication of whether material will perform its intended purpose. Engineering judgment may be used to substantiate the use of material failing to meet the specification if the material still meets the intended purpose. Statistical validation is a measure of whether the OV and QA populations are statistically equal. It does not represent the quality of material being incorporated into the Project.

3.5.1 Non-Validation and Status of Material Quality

When OV test results do not statistically validate the QA test results as outlined in Section - 3.4.3.1 Statistical Analysis, TxDOT and CQAF jointly investigate the source of non-validation. If the non-validation

persists over five consecutive Level 1 F- and t- analyses per Appendix D, a process NCR shall be issued to formally document and seek resolution to the non-validation.

In addition to the need to investigate the non-validation, the material in question has to be immediately evaluated to determine if it can be left in place or has to be removed, reworked or repaired. If material is to remain incorporated into the Project, the material in question will be evaluated using the process described in this section. The appropriate (CQAF or TxDOT) party may exercise Engineering Judgment to determine that the material will perform its intended purpose. There are four possible combinations of passing and failing results between the QA and OV test results.

1. Both the QA and OV test results pass specification limits:

   Although statistical validation has not occurred, both the CQAF and OV test results are passing the established specification limits. Thus, material quality in question is considered acceptable.

2. QA test results fail and OV test results pass specification limits:

   Material may be left in place if the CQAF determines that Engineering Judgment may be used to accept the material or if the material is accepted through the NCR process.

3. Both the QA and OV test results fail the specification limits:

   Material may be left in place if the CQAF determines that Engineering Judgment may be used to accept the material or if the material is accepted through the NCR process. The acceptance of material is subject to one of the two scenarios below.

   a. OV test result indicates reasonable conformance with specification requirements and TxDOT exercises Engineering Judgment to concur with acceptance of material based on the CQAF's Engineering Judgment or through the NCR process.

   b. OV test result does not indicate reasonable conformance with specification requirement and the CQAF must perform an additional fixed test at the OV failed test location. Based on the results of CQAF test result and subsequent investigation discussions between TxDOT and the Developer, a determination is made and documented on whether the material may be left in place.

4. QA test results pass but OV test results fail specification limits:

   Material may be left in place if the CQAF determines that Engineering Judgment may be used to accept the material or if the material is accepted through the NCR process. This is subject to TxDOT response in the two scenarios below.

   a. OV test result indicates reasonable conformance with specification requirements and TxDOT exercises Engineering Judgment to concur with acceptance of material based on the CQAF's Engineering Judgment or through the NCR process.

b. OV test result does not indicate reasonable conformance with specification requirement and the CQAF must perform an additional fixed test at the OV failed test location. Based on the results of CQAF test result and subsequent investigation discussions between TxDOT and the Developer, a determination is made and documented on whether the material may be left in place.

3.5.2 Referee Testing

Disputes over specific test results may be resolved in a reliable, unbiased manner by referee testing and evaluation performed by a referee laboratory. The referee laboratory shall be the Construction Division, Materials & Pavements Section (CSTM&P) central laboratory or a testing laboratory qualified according to Section 4.0, Independent Assurance Program, and approved by TxDOT. The decision by the referee laboratory shall be final.

SECTION 4 - INDEPENDENT ASSURANCE PROGRAM

4.1 General

TxDOT's, or their designee, shall implement the Independent Assurance (IA) program. This IA program evaluates all sampling and testing procedures, personnel, and equipment used as part of an acceptance decision. The IA program evaluates the qualified sampling and testing personnel and testing equipment and is established using the system approach. The system approach bases frequency of IA activities on time, regardless of the number of tests, quantities of materials, or numbers of projects tested by the individual being evaluated.

This program provides uniform statewide procedures to ensure that tests are performed by qualified personnel and that laboratory facilities and equipment are adequate to perform the required sampling and testing methods. The following frequencies and activities are required for evaluating sampling and testing personnel and equipment under the system approach to IA.

Table 1 – Independent Assurance Observation and Qualification Frequencies

Frequencies and Activities	
Time	**Activity**
Prior to performing acceptance sampling and testing.	Qualification is required under Sections 4.2 and 4.3 of this QAP.
Within 12 months after Observation and Qualification.	Each qualified technician is required to participate in one proficiency or split sample test for each test method requiring IA. Results must compare to the IA test results to within the established tolerance.
Within 24 months after Observation and Qualification.	Each qualified technician is required to participate in one proficiency or split sample test for each test method requiring IA. Results must compare to the IA test results to within the established tolerance.
Within 36 months of Qualification.	Qualification is again required under the Sections 4.2 and 4.3 of this QAP.

NOTE: For American Concrete Institute (ACI) certification, the above frequency is extended to five years for Concrete Field Technician – Grade I and Concrete Laboratory Technician – Level I, and six years for Concrete Strength Technician. Maintaining technician qualification under the IA systems approach requires continuation of the above cycle of qualification and successful split or proficiency sample testing.

4.2 Personnel Qualifications

Personnel performing tests on the Project must be qualified in the appropriate test methods.

4.2.1 Required Certifications

Sampling and testing personnel must obtain and keep current the following certifications unless otherwise waived by governing specifications:

A. ACI Concrete Field Testing Technician – Grade I;
B. ACI Concrete Strength Testing Technician;
C. TxAPA HMA Plant Production Specialist – Level 1A;
D. TxAPA HMA Roadway Specialist – Level 1B;
E. TxAPA HMA Mix Design Specialist – Level 2;
F. TxAPA Properties Specialist – SB 101;
G. TxAPA Field Specialist – SB 102;
H. TxAPA Materials Analysis Specialist – SB 103;
I. TxAPA Strength Specialist – SB 201;
J. TxAPA Compressive Strength Specialist – SB 202.

Reciprocity may be granted to individuals who have been successfully qualified under another state's program. These situations will be considered on a case-by-case basis and must meet the approval of the Director of CSTM&P.

For those testing procedures not covered by the above certifications, the following personnel may qualify an individual to perform the required sampling and testing of materials:

A. Qualified Independent Assurance Laboratory personnel which have been authorized by TxDOT to perform personnel qualifications.
B. Construction Division, Materials & Pavements Section (CSTM&P) personnel.

4.2.2 QA, OV and IA Personnel

Any individual who performs tests on materials for acceptance must be qualified to perform tests in the areas of hydraulic cement concrete, soils and aggregates and bituminous materials.

Appendix E – Test Methods for Personnel Qualification provides test methods for which individuals are to be qualified. There may be other tests that are required based on project-specific specification and may require qualification.

To qualify, an individual must successfully perform the specific test and the necessary calculations required to determine specification compliance in the presence of an authorized evaluator. Successful performance is defined as demonstrating the ability to properly perform the key elements for each test method. If the

individual fails to demonstrate the ability to perform a test, the individual will be allowed one retest per test method at the evaluator's convenience.

After successful performance of a test method, the individual must also pass a written examination (minimum score of 80%) administered by an authorized evaluator. An individual failing the written examination may request a retest. The retest must be scheduled and administered within thirty days of notification of failure. Failure to pass the second written examination shall be considered as failing the entire qualification.

If an individual fails to qualify on a specific test method or the qualification is revoked, the individual must obtain additional training before the individual can retest on that specific test.

In addition, for tests that CSTM&P requires an annual split/proficiency sample evaluation, the individual must participate in split/proficiency samples given by the qualification authority to validate the qualification. Appendix F – Test Methods for Split/Proficiency Evaluation provides a list of testing procedures required for split/proficiency evaluation. CSTM&P determines the qualification authority for the split/proficiency sample. The results of the samples will be evaluated against TxDOT's acceptable tolerance limits shown in Appendix B – Split Sample Tolerance Limits. If the comparisons of the test results do not comply with the tolerances, an engineering review of the test procedures and equipment will be performed immediately to determine the source of the discrepancy. Corrective actions must be identified and incorporated as appropriate, prior to the individual performing additional testing on that test method.

Under unique circumstances, the qualification authority may grant a verbal examination upon request. The reason(s) for requesting a verbal examination must be presented and documented prior to the individual being allowed to take the examination.

Unless otherwise stated, qualification of an individual is valid for not more than three years, after which the individual must be re-qualified. Under the Independent Assurance (IA) system approach, annual split/proficiency will be required as specified in Table 1 – Independent Assurance Observation and Qualification Frequencies.

4.2.3 Documentation

The IA laboratory manager is responsible for maintaining documentation of all individuals qualified under their authority who perform required tests for acceptance of materials. Documentation to be maintained includes:

A. A sampling and testing personnel qualification summary in an electronic format that lists all of the testing procedures the individual has been qualified to perform;
B. Copies of any qualification certificates issued by ACI and TxAPA.
C. Copies of the qualification certificates issued by the IA laboratory with expiration dates;
D. Original written examinations for test procedures administered to each technician by the IA laboratory, with clear identification of technician's name, qualifier's name, score, and date taken.
E. Original performance examinations for test procedures administered to each technician by the IA laboratory, with clear identification of technician's name, qualifier's name, qualification status, and date;
F. Results of annual proficiency testing administered by the IA laboratory for each technician.

Documentation retention will be for the life of the qualification. Qualification authority must be shown on the certificate given to each individual.

4.2.4 Disqualification

Accusations of misconduct by testing technicians are made to the responsible Owner representative. The three levels of misconduct are neglect, abuse, and breach of trust and are defined in the Table 2 below.

Table 2 – Levels of Misconduct

Term	Definition
Neglect	Unintentional deviations from testing procedures or specifications
Abuse	Careless or deliberate deviation from testing procedures or specifications
Breach of Trust	Violation of the trust placed in the certified technician including, but not limited to, acts such as: • Falsification of records • Being aware of improprieties in sampling, testing, and/or production by others and not reporting them to appropriate supervisors involved in the project • Re-sampling and/or retesting without awareness and consent of appropriate supervisors involved in the project; and/or • Manipulating compensation and/or production.

Penalties may be implemented upon recommendation by the responsible Owner representative, and the penalties may range from a reprimand to a permanent revocation of the certification.

Any technician who is found guilty of breach of trust will have their certification permanently revoked. Any technician with a revoked certification will be removed from the project and will not be allowed to be employed on any TxDOT project statewide.

4.3 Laboratory Qualifications

Laboratories where IA, QA, and OV tests will be performed must be qualified. Appendix H provides the minimum qualification requirements for laboratories.

4.3.1 Laboratory Qualification Responsibility

The CSTM&P central laboratory will be accredited under the American Association of State Highway and Transportation Officials (AASHTO) Laboratory Accreditation Program.

CSTM&P is responsible for overseeing the statewide laboratory qualification program and for qualifying the IA laboratory. The IA laboratory is responsible for qualifying QA and OV laboratories.

4.3.2 Laboratories to be Qualified

All laboratories performing testing for TxDOT require qualification. These include, but are not limited to the following:

A. CSTM&P central laboratory;
B. CSTM&P field laboratories;
C. IA laboratory
D. Referee laboratory
E. QA laboratory;
F. Contractor laboratories;
G. Vendor laboratories (material suppliers).

4.3.3 Qualification Process

The laboratory qualifying authority will:

A. Identify the scope of testing to be performed;
B. Verify that manuals and/or test methods used to perform tests are available and up-to-date;
C. Document that the laboratory has the required equipment to perform the tests; and
D. Check the calibration/verification records for each piece of equipment, to include:
    a. Description of equipment;
    b. Identification of any traceable standard used;
    c. Frequency of calibration;
    d. Date of last calibration;
    e. Date of next calibration;
    f. Procedure used to calibrate equipment; and
    g. Procedure used to identify equipment not in compliance.

In addition, all equipment may be subjected to calibration verification or other inspection by the qualifying authority.

4.3.4 Independent Assurance Testing Equipment

CSTM&P will qualify IA laboratory testing equipment used for IA sampling and testing, according to Section 4.3 - Laboratory Qualifications.

The IA laboratory will qualify all other department testing equipment and AASHTO accredited commercial laboratory equipment used for IA sampling and testing.

Qualify testing equipment according to these guidelines:

A. Frequency for qualifying IA sampling and testing equipment will not exceed one (1) year;
B. Calibration/verification is required whenever the laboratory or equipment is moved; and
C. IA equipment shall be other than that used for performing owner verification (OV), quality acceptance (QA) or quality control (QC) testing.

Any equipment used to perform OV, QA, and/or QC sampling and testing in making an acceptance decision will be evaluated by IA sampling and testing personnel. This evaluation includes calibration checks

and split or proficiency sample tests. The requirements for, and frequency of, equipment calibrations are shown in TxDOT's test procedures, as referenced in Section 4.3.5 – Calibration Standards for Laboratory Equipment. Acceptable tolerance limits for the comparison of test results from split or proficiency samples are shown in Appendix B – Split Sample Tolerance Limits.

4.3.5 Calibration Standards for Laboratory Equipment

The standards for calibration and the frequencies for laboratory equipment calibrations are shown in:

A. Tex-198-E, Minimum Standards for Acceptance of a Laboratory for Soils and Flexible Base Testing;
B. Tex-237-F, Minimum Standards for Acceptance of a Laboratory for Hot Mix Testing; and
C. Tex-498-A, Minimum Standards for Acceptance of a Laboratory for Concrete and Aggregate Testing.

4.3.6 Frequency for Laboratory Qualification

Laboratories are qualified at an interval not to exceed three (3) years. Calibration/verification is required whenever the laboratory or equipment is moved. Equipment used in IA sampling and testing will be verified at intervals not to exceed one (1) year.

4.3.7 Documentation

The project Owner is responsible for verifying that laboratories are qualified to perform TxDOT testing. Documentation will be required to be kept by the qualified laboratory and the project Owner. Calibration records will be maintained for three (3) years, unless another agency requires a longer period.

4.3.8 Non-Compliance

A laboratory that does not meet the above requirements is subject to disqualification. Any equipment in a qualified laboratory failing to meet specified equipment requirements for a specific test method shall not be used for that test method.

4.3.9 Dispute Resolution

The next higher qualification authority will resolve disputes concerning calibration and verification of equipment. For disputes that cannot be resolved at the project level, CSTM&P will be the final authority.

4.3.10 AASHTO Accreditation

In addition to TxDOT laboratory qualification, QA, OV, IA, and referee laboratories shall be accredited under the AASHTO Accreditation Program (AAP). The accreditation must be maintained throughout the life of the project. The laboratory must also participate in the AASHTO Materials Reference Laboratory /Concrete and Cement Reference Laboratory (AMRL/CCRL) proficiency programs. A copy of AAP accreditation certificate(s) shall be transmitted to TxDOT upon their receipt by the testing laboratory. The AAP accreditation shall include all test methods equivalent to that of TxDOT's test methods as shown in Appendix H – Minimum Qualification Requirements for Laboratories.

4.4 Annual Report

CSTM&P shall compose and submit an annual report to the Federal Highway Administration (FHWA) Division Administrator summarizing the results of TxDOT's systems approach IA program. This report shall identify:

A. Number of sampling and testing personnel evaluated by the systems approach IA testing;
B. Number of IA evaluations found to be acceptable;
C. Number of IA evaluations found to be unacceptable; and
D. Summary of any significant system-wide corrective actions taken.

The IA laboratory shall compile and submit a project-level IA report to CSTM&P.

Appendix A
Acronyms and Definitions

The following terms and definitions are referenced in this manual and have the meanings set forth below:

AAP	AASHTO Accreditation Program
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AMRL	AASHTO Materials Reference Laboratory
AQMP	Aggregate Quality Monitoring Program
CCRL	Concrete and Cement Reference Laboratory
CDA	Comprehensive Development Agreement
CFR	Code of Federal Regulations
CSTM&P	TxDOT Construction Division, Materials and Pavements Section
CQAF	Construction Quality Acceptance Firm
CQAM	Construction Quality Acceptance Manager
CQCM	Construction Quality Control Manager
CQMP	Construction Quality Management Plan
CVL	Controlled Vocabulary List
FHWA	Federal Highway Administration
IA	Independent Assurance
NCR	Nonconformance Record
OV	Owner Verification
OVTIP	Owner Verification Testing and Inspection Plan
QA	Quality Acceptance
QAP	Quality Assurance Program
QC	Quality Control
QMP	Quality Monitoring Program
RFI	Request for Information
SEP-15	Special Experimental Project Number 15 or SEP-15 derives
TxDOT	Texas Department of Transportation

Acceptance Program shall mean the all factors that comprise the State highway agency's program to (SHA) determine quality of the product as specified in the contract requirements. These factors include acceptance and verification sampling, testing, and inspection and may include results of quality control sampling and testing.

CDA Documents shall have the meaning set forth in he executed agreement between TxDOT and Developer.

Controlled Vocabulary List shall mean the list of agreed-upon nomenclature used to uniquely identify each QA and OV testing report.

Construction Quality Acceptance Firm shall mean the independent construction quality acceptance firm required as part of the Developer's team.

Design Firm shall mean the qualified Registered Professional Engineer's firm responsible for the design of the Project.

Design Documents shall mean all drawings (including plans, profiles, cross-sections, notes, elevations, sections, details and diagrams), specifications, reports, studies, calculations, electronic files, records and submittals necessary for, or related to, the design of the Project and/or the Utility Adjustments in accordance with the CDA Documents, the Governmental Approvals and applicable Law.

Developer shall mean the entity identified in the Agreement to perform Work under the Project, together with its successors and assigns.

Engineer in Responsible Charge shall mean the professional engineer accountable for direction, control and supervision to assure that the Work has been critically examined and evaluated for compliance with appropriate professional standards and the requirements of the CDA Documents and the Maintenance Agreement Documents, as applicable.

Engineering Judgment shall mean determinations as to whether a material failing to meet specification requirements and not within applicable tolerances should be accepted, or not accepted, shall be based upon sound engineering principles, experience, and/or related results of applicable material tests, and be made by a Texas Licensed Professional Engineer.

Final Acceptance shall mean the occurrence of all of the events and satisfaction of all of the conditions set forth in the CDA Documents, as and when confirmed by TxDOT's issuance of a certificate of Final Acceptance

F-test shall mean the statistical analysis to compare the variances of two sets of data.

Governmental Approval shall mean any permit, license, consent, concession, grant, franchise, authorization, waiver, variance or other approval, guidance, protocol, mitigation agreement, or memoranda of agreement/understanding, and any amendment or modification of any of them provided by Governmental Entities, including State, local, or federal regulatory agencies, agents, or employees, which authorize or pertain to the Work or the Project, but excluding any such approvals given by or required from any Governmental Entity in its capacity as a Utility Owner.

Governmental Entities shall mean any federal, State or local government and any political subdivision or any governmental, quasi-governmental, judicial, public or statutory instrumentality, administrative agency, authority, body or entity other than TxDOT.

Independent Assurance Program shall all activities that are included in an unbiased and independent evaluation program for all the sampling and testing procedures used in the Acceptance Program.

Law or Laws means (a) any statute, law, code, regulation, ordinance, rule or common law, (b) any binding judgment (other than regarding a Claim or Dispute), (c) any binding judicial or administrative order or decree (other than regarding a Claim or Dispute), (d) any written directive, guideline, policy requirement or other governmental restriction (including those resulting from the initiative or referendum process, but excluding those by TxDOT within the scope of its administration of the CDA Documents) or (e) any similar form of decision of or determination by, or any written interpretation or administration of any of the

foregoing by, any Governmental Entity, in each case which is applicable to or has an impact on the Project or the Work, whether taking effect before or after the Effective Date, including Environmental Laws. "Laws", however, excludes Governmental Approvals.

Level of Significance (alpha) shall mean the probability of erroneously rejecting the null hypothesis when it should have been accepted.

Nonconforming Work (Nonconformance) shall mean Work that has not been constructed with the strictest adherence to the approved drawings and specifications and with the requirements of the Contract Documents, the Governmental Approvals and applicable Law.

Nonconformance Record (NCR) shall mean a record of how Nonconforming Work was accepted for incorporation into the Work.

Proficiency samples shall mean homogenous samples that are distributed and tested by two or more laboratories and/or personnel. The test results are compared to assure that the laboratories and/or personnel are obtaining the same results.

Project shall have the meaning set forth in Recital B to the Agreement.

Qualification shall mean a quality, ability, or accomplishment that makes a person technically competent for a particular position or task.

Quality acceptance shall mean all planned and systematic actions performed by the CQAF as defined in the CDA for their portion of the acceptance decision.

Quality assurance shall mean all planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

Quality Assurance Program shall mean the program for quality management and control of the Project and Work, as described in the CDA Documents.

Quality control shall mean all contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

Random Sampling shall mean a process whereby each element of the population has an equal chance of being selected.

Registered Professional Engineer shall mean a person who is duly licensed and registered by the Texas Board of Professional Engineers to engage in the practice of engineering in the State.

Rules shall mean Texas Administrative Code.

Substantial Completion shall mean the occurrence of all of the events and satisfaction of all of the conditions set forth in the Agreement, as and when confirmed by TxDOT's issuance of a Certificate of Substantial Completion.

Subcontractor shall mean any parties with whom Developer has entered into any Subcontract to perform any part of the Work or provide any materials, equipment or supplies for the Project on behalf of Developer and any other party with whom any Subcontractor has further subcontracted any part of the Work, at all tiers.

Supplier shall mean any Person not performing work at or on the Site which supplies machinery, equipment, materials, hardware, software, systems or any other appurtenance to the Project to Developer or to any Subcontractor in connection with the performance of the Work. Persons who merely transport, pick up, deliver or carry materials, personnel, parts or equipment or any other items or persons to or from the Site shall not be deemed to be performing Work at the Site.

TxDOT Standard Specifications shall mean the Texas Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges, adopted by the Texas Department of Transportation including all revisions thereto applicable on the effective date of the agreement.

t-test shall mean the statistical analysis to compare the variances of two sets of data.

Utility or **utility** shall mean a public, private, cooperative, municipal and/or government line, facility or system used for the carriage, transmission and/or distribution of cable television, electric power, telephone, telegraph, water, gas, oil, petroleum products, steam, chemicals, hydrocarbons, telecommunications, sewage, storm water not connected with the drainage of the Project, and similar substances that directly or indirectly serve the public.

Utility Owner shall mean the owner or operator of any Utility (including both privately held and publicly held entities, cooperative utilities, and municipalities and other governmental agencies).

Vendor shall mean a supplier of project-produced material that is not the contractor.

Verification Testing shall mean sampling and testing performed to validate the quality of the product. The sampling and testing are to be performed by qualified testing personnel employed by the SHA or its designated agent, excluding the contractor and vendor.

Work shall mean all of the work required under the CDA Documents, including all administrative, design, engineering, real property acquisition and occupant relocation, support services, utility adjustment work to be furnished or provided by Developer, reimbursement of Utility Owners for utility adjustment work furnished or provided by such Utility Owners or their contractors and consultants, procurement, professional, manufacturing, supply, installation, construction, supervision, management, testing, verification, labor, materials, equipment, maintenance, documentation and other duties and services to be furnished and provided by Developer as required by the CDA Documents, including all efforts necessary or appropriate to achieve Final Acceptance, except for those efforts which such CDA Documents expressly specify will be performed by parties other than the Developer-related entities.

Appendix B
Split Sample Tolerance Limits

PROCEDURE	TEST METHOD	TOLERANCE
Embankment		
Liquid Limit	Tex-104-E	15% of mean *
Plasticity Index	Tex-106-E	20% of mean *
Linear Shrinkage	Tex-107-E	± 2
Gradation	Tex-110-E	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Moisture-Density	Tex-114-E	2.0 pcf of mean *
In-place Density	Tex-115-E	± 2.5%
Retaining Wall – Non-Select Backfill		
Liquid Limit	Tex-104-E	15% of mean *
Plasticity Index	Tex-106-E	20% of mean *
Linear Shrinkage	Tex-107-E	± 2
Gradation	Tex-110-E	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Moisture-Density	Tex-114-E	2.0 pcf of mean *
In-place Density	Tex-115-E	± 2.5%
Retaining Wall – Select Backfill		
Gradation	Tex-110-E	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
In-place Density	Tex-115-E	± 2.5%
pH	Tex-128-E	± 0.1
Resistivity	Tex-129-E	± 1,000 ohm-cm
Untreated & Treated Subgrade and Base Courses		
Moisture Content	Tex-103-E	± 1% (point)
Liquid Limit	Tex-104-E	15% of mean *
Plasticity Index	Tex-106-E	20% of mean *
Linear Shrinkage	Tex-107-E	± 2
Gradation	Tex-110-E	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Moisture-Density	Tex-113-E	2.0 pcf of mean *
In-place Density	Tex-115-E	± 2.5%
Wet Ball Mill	Tex-116-E	10% of mean *
Compressive Strength	Tex-117-E	10 psi of mean *
Thickness	Tex-140-A	0.25 in.
Asphalt Stabilized Base		
Gradation	Tex-200-F	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Liquid Limit	Tex-104-E	15% of mean *
Plasticity Index	Tex-106-E	20% of mean *

PROCEDURE	TEST METHOD	TOLERANCE
Wet Ball Mill	Tex-116-E	10% of mean *
Thickness	Tex-140-E	0.25 in.
Percent Asphalt	Tex-236-F	± 0.3%
In-place Density (Cores)	Tex-207-F	± 1%
Sand Equivalent	Tex-203-F	± 5
Decantation	Tex-217-F	20% of mean *
Coarse Aggregate Angularity	Tex-460-A	± 5
Surface Treatment Aggregate		
Gradation	Tex-200-F	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Deleterious Material	Tex-217-F	± 0.3%
Decantation	Tex-217-F	20% of mean *
Coarse Aggregate Angularity	Tex-460-A	± 5
Hydraulic Cement Concrete Coarse Aggregate		
Gradation	Tex-401-A	> No. 4 sieve: ± 5% (pts.)
		≤ No. 4 sieve: ± 3% (pts.)
Decantation	Tex-406-A	20% of mean *
Deleterious Material	Tex-413-F	± 0.3%
Hydraulic Cement Concrete Fine Aggregate		
Sand Equivalent	Tex-203-F	± 5
Gradation: 3/8" thru No. 200	Tex-401-A	± 3% (pts.)
Fineness Modulus	Tex-402-A	± 0.2
Deleterious Material	Tex-413-F	± 0.3%
Hydraulic Cement Concrete Complete Mixture		
Slump	Tex-415-A	± 1"
Entrained Air Content	Tex-414-A	± 1%
	Tex-416-A	
Temperature	Tex-422-A	2°F
Compressive Strength	Tex-418-A	17% of mean * (4x8")
		14% of mean * (6x12")
Flexural Strength	Tex-448-A	± 19%
Hot-Mix Asphalt Coarse Aggregate		
Gradation	Tex-200-F	> No. 8 sieve: ± 5% (pts.)
		≤ No. 8 sieve: ± 3% (pts.)
Deleterious Material	Tex-217-F	± 0.3%
Decantation	Tex-217-F	20% of mean *
Hot-Mix Asphalt Coarse Aggregate		
Gradation: No. 10 thru No. 200	Tex-200-F	± 3% (pts.)
Linear Shrinkage	Tex-107-E	± 2
Hot-Mix Asphalt Combined Aggregate		
Gradation	Tex-200-F	> 5/8" sieve: ± 5% (pts.)
		5/8" thru No. 200: ± 3% (pts.)
		Pass. No. 200: ± 1.5% (pts.)
Sand Equivalent	Tex-203-F	± 5

PROCEDURE	TEST METHOD	TOLERANCE
Hot-Mix Asphalt Complete Mixture		
Asphalt Content	Tex-228-F	± 0.3%
	Tex-236-F	± 0.3%
Maximum Theoretical Specific Gravity	Tex-227-F	± 0.020
Laboratory Molded Density	Tex-207-F	± 1.0%
Laboratory Molded Bulk Specific Gravity	Tex-207-F	± 0.020
Moisture Content	Tex-212-F	± 0.2 mL
In-place Air Voids (Core)	Tex-207-F	± 1.0%

* The difference between compared test results shall not exceed the indicated percentage of the mean of the compared test results where the mean is the average of the two test results.

NOTE: The above tolerances are to be used when comparison of test results is by split samples. A tolerance of plus or minus two (2) standard deviations shall be used when comparison of test results is by proficiency samples.

Appendix C
I2MS Data Transfer Requirements

XML submission allows for the direct entry of all QA Laboratory results to be sent and recorded into I2MS without additional levels of data entry. The XML structure, schema and currently available tests for documentation in I2MS are detailed in this Appendix.

If there is a specific test that is not listed in the database that is required in I2MS the schema and report set up will need to be submitted to TxDOT for approval, 60 days prior to testing submission.

CQAFSample.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
- <form name="DB-115-1" version_no="1.0" key="0020905270501151" date="2009-05-27T00:00:00" display_key="00209052705">
<owner_name value="CQAF" />
<security username="CQAFDataXfer" password="*********" />
- <header>
<column name="sample_id" value="00209052705" />
<column name="sampled_date" value="5/27/2009 12:00:00 AM" />
<column name="sample_type" value="Random-Independent" />
<column name="split_sample_id" />
<column name="report_type" value="Original" />
<column name="section" value="5.1" />
<column name="sampled_by" value="Al Jones" />
<column name="spec_year" value="2004" />
<column name="material" value="14" />
<column name="spec_item" value="247" />
<column name="supplier" value="Pit" />
<column name="special_provision" />
<column name="structure_number" />
<column name="grade" value="1" />
<column name="sample_location" />
<column name="feature" value="Mainlane" />
<column name="course_lift" value="2" />
<column name="station" value="342+49" />
<column name="dist_from_cl" value="5' LT" />
<column name="misc" />
<column name="roadway" value="Loop 375" />
<column name="direction" value="NB" />
</header>
- <test name="DB-115-1">
- <!--
This can be the same value as the form name.
-->
- <table name="VALUE_DB115_1">
```

```
- <row>
  <column name="determined_by_test_method" value="DB-113-E" />
  <column name="max_dry_density_pcf" value="132.5" />
  <column name="optimum_moisture_content_pct" value="7.7" />
  <column name="density_standard" value="4200" />
  <column name="moisture_standard" value="420" />
  <column name="density_count" value="1045" />
  <column name="moisture_count" value="231" />
  <column name="probe_depth" value="10" />
  <column name="wet_density_pcf" value="140.5" />
  <column name="dry_density_pcf" value="133.5" />
  <column name="moisture_content_pct" value="5.2" />
  <column name="gauge_no" value="3242" />
  <column name="moisture_content_pct_pass_fail" />
  <column name="density_pct" value="100.7" />
  <column name="density_pct_pass_fail" />
  <column name="density_specification_req_max" />
  <column name="moisture_specification_req_max" />
  <column name="soil_desc" />
  <column name="density_specification_req_min" value="100" />
  <column name="moisture_specification_req_min" value="5.2" />
  <column name="tested_by" value="Al Jones" />
  <column name="tested_date" value="5/27/2009 12:00:00 AM" />
  <column name="stamp_code" value="1" />
  </row>
  </table>
  </test>
- <footer>
  <column name="remarks" />
  <column name="reviewed_by" />
  <column name="completed_date" />
  <column name="authorized_by" />
  <column name="authorized_date" />
  </footer>
  </form>
```

I2MS Test Form Fields

Purpose

The purpose of this document is to provide information on the tables and fields within I2MS.

Material Test Forms

Material Test Forms are forms used to run tests for a sample. A test form contains header and footer information which all forms have in common. Each test form also has a form body containing fields specific to the test method(s) being performed.

Header Fields

The header information is the metadata of the form. It is vital for searching for and analyzing records. All of the test forms have similar header information.

Table Name: HEADER_VALUE_OVT **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Course Lift	course_lift	nvarchar	250	
Direction	direction	nvarchar	250	CVL
Distance From CL	dist_from_cl	nvarchar	250	
Feature	feature	nvarchar	250	CVL
Grade	grade	nvarchar	100	CVL
Material	material	nvarchar	100	CVL
Misc	misc	nvarchar	250	
Report Type	report_type	nvarchar	250	CVL
Roadway	roadway	nvarchar	250	CVL
Sample ID	sample_id	nvarchar	13	
Sample Location	sample_location	nvarchar	250	
p	sample_type	nvarchar	100	CVL
Sampled By	sampled_by	nvarchar	250	CVL
Sampled Date	sampled_date	datetime		MM/dd/yyyy
Section	section	nvarchar	100	CVL
Spec Item	spec_item	nvarchar	100	CVL
Spec Year	spec_year	nvarchar	250	
Special Provision	special_provision	nvarchar	250	CVL
Split Sample ID	split_sample_id	nvarchar	250	
Station	station	nvarchar	250	Pattern: [0-9]+\+[0-9][0-9](\.[0-9][0-9])?

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Structure Number	structure_number	nvarchar	250	CVL
Supplier	supplier	nvarchar	100	CVL

Footer Fields

The footer contains approval data and comments for each of the test forms.

Table Name: FOOTER_VALUE_OVT **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Authorized By	authorized_by	nvarchar	100	CVL
Authorized Date	authorized_date	smalldatetime		MM/dd/yyyy
Completed Date	completed_date	smalldatetime		MM/dd/yyyy
Digital Signature ID 1	dig_sig_id1	int		
Digital Signature ID 2	dig_sig_id2	int		
Remarks	remarks	text		
Reviewed By	reviewed_by	nvarchar	100	CVL

Body Fields

Pulverization Gradation (DB-101-E, Part III)

Table Name: VALUE_DB101_3E_TEST **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Individual or Cumulative	individual_cumulative	nvarchar	100	Individual, Cumulative
Minus #40 Sieve	negative_no_40	nvarchar	100	
Total Weight	total	nvarchar	100	
Test Method	test_method	nvarchar	100	
Tested By	tested_by	nvarchar	100	
Tested Date	tested_date	datetime		MM/dd/yyyy
Stamp Code	stamp_code	int		

Table Name: VALUE_DB101_3E_SIEVE **Maximum Rows: 4**

Field Description	Field Name	Datatype	Length	Values
Sieve Size	sieve_size	nvarchar	100	3", 2-1/2", 2", 1-3/4", 1-1/2", 1", 7/8", 3/4", 1/2", 3/8", No.4, No.8, No.16, No.30, No.40, No.50, No.100, No.200
Weight Retained	weight_retained	decimal	(19, 8)	

Cumulative Weight Retained	cumulative_weight_retained	decimal	(19, 8)	
Cumulative Percent Passing	cumulative_pct_passing	decimal	(19, 8)	
Lower Specification Limit	lower_spec_limit	decimal	(19, 8)	
Upper Specification Limit	upper_spec_limit	decimal	(19, 8)	
Within Master Gradation Limits	master_grading	nvarchar	100	Yes, No

Moisture Content of Aggregates (DB-103-E)

Table Name: VALUE_DB103E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Dish No.	dish_no	nvarchar	100	
Mass of Dry Sample	dry_sample_tare	decimal	(19, 8)	
Moisture Content	moisture_content	decimal	(19, 8)	
Payable Weight of Class 2 Flex Base	payable_weight	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tare Mass	tare_mass	decimal	(19, 8)	
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Mass of Wet Sample Tare	wet_sample_tare	decimal	(19, 8)	
Wet Weight of Class 2 Flex Base	wet_weight	decimal	(19, 8)	

Liquid Limit, Plastic Limit, Plastic Index (DB-104-6)

Table Name: VALUE_DB104E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Liquid Limit	liquid_limit_total	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB104E_SAMPLE **Maximum Rows: 6**

Field Description	Field Name	Datatype	Length	Values
Dish No.	dish_no	nvarchar	100	
Liquid Limit (%)	liquid_limit	decimal	(19, 8)	
Mass of Dry Sample + Tare (g)	mass_dry_sample	decimal	(19, 8)	
Mass of Wet Sample + Tare (g)	mass_wet_sample	decimal	(19, 8)	
Moisture Content, %	moisture_content	decimal	(19, 8)	
Number of Blows	number_blows	int		

Tare Mass (g)	tare_mass	decimal	(19, 8)	

Table Name: VALUE_DB105E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Plastic Limit	plastic_limit_total	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB105E_SAMPLE **Maximum Rows: 3**

Field Description	Field Name	Datatype	Length	Values
Dish No.	dish_no	nvarchar	100	
Mass of Dry Sample + Tare (g)	mass_dry_sample	decimal	(19, 8)	
Mass of Wet Sample + Tare (g)	mass_wet_sample	decimal	(19, 8)	
Plastic Limit (%)	plastic_limit	decimal	(19, 8)	
Tare Mass (g)	tare_mass	decimal	(19, 8)	
Mass of Water (g)	water_mass	decimal	(19, 8)	

Table Name: VALUE_DB106E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Plastic Index	plasticity_index	int		
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Use Bar Linear Shrinkage to Calculate Plasticity Index?	use_bar_linear	nvarchar	100	{Yes, No}

Bar Linear Shrinkage (DB-107-E)

Table Name: VALUE_DB107E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Calculate Plasticity Index	calculate_plasticity_index	bit		{Yes, No}
Final Length	final_length	decimal	(19, 8)	
Initial Length	initial_length	decimal	(19, 8)	
Linear Shrinkage	linear_shrinkage	decimal	(19, 8)	
Maximum By Specification	maximum_by_specification	decimal	(19, 8)	
Minimum By Specification	minimum_by_specification	decimal	(19, 8)	
Plasticity Index	plasticity_index	decimal	(19, 8)	

Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Unit	unit	nvarchar	100	

Particle Size Analysis (DB-110-E)

Table Name: VALUE_DB110E_SIEVE **Maximum Rows: 6**

Field Description	Field Name	Datatype	Length	Values
Cumulative Percent Retained	cumulative_pct_retained	decimal	(19, 8)	
Cumulative Weight Retained	cumulative_weight_retained	decimal	(19, 8)	
Lower Spec Limit	lower_spec_limit	decimal	(19, 8)	
Master Grading	master_grading	nvarchar	100	
Sieve Size	sieve_size	nvarchar	100	CVL
Upper Spec Limit	upper_spec_limit	decimal	(19, 8)	
Weight Retained	weight_retained	decimal	(19, 8)	

Table Name: VALUE_DB110E_TEST **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Cumulative Method	individual_cumulative	nvarchar	100	{Cumulative, Individual}
Negative No.40	negative_no_40	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Total	total	nvarchar	100	

Moisture-Density Work Sheet (DB-113-E)

Table Name: VALUE_DB113E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Dry Density Scale Max	dry_density_scale_max	decimal	(19, 8)	
Dry Density Scale Min	dry_density_scale_min	decimal	(19, 8)	
Dry Density Scale unit	dry_density_scale_unit	decimal	(19, 8)	
Hygroscopic Moisture	hygroscopic_moisture	decimal	(19, 8)	
Max Density(kg)	max_density_kg	decimal	(19, 8)	
Max Density (pcf)	max_density_pcf	decimal	(19, 8)	
Moisture scale max	moisture_scale_max	decimal	(19, 8)	
Moisture scale min	moisture_scale_min	decimal	(19, 8)	

Moisture scale unit	moisture_scale_unit	decimal	(19, 8)	
Optimum Moisture	optimum_moisture	decimal	(19, 8)	
Oven Dry Weight	oven_dry_weight	decimal	(19, 8)	
Soil Description	soil_desc	nvarchar	100	
Specific Gravity (Apparent)	specific_gravity	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Weight of Aggr., Pycn. & Water	weight_of_aggr	decimal	(19, 8)	
Weight of Pycnometer & Water	weight_of_pycnometer	decimal	(19, 8)	

Table Name: VALUE_DB113E_SPECIMEN **Maximum Rows: 4**

Field Description	Field Name	Datatype	Length	Values
Dry Density	dry_density	decimal	(19, 8)	
Dry Mass Material	dry_mass_material	decimal	(19, 8)	
Dry Mass Pan & Specimen	dry_mass_pan_specimen	decimal	(19, 8)	
Estimated Dry Density	est_dry_density	decimal	(19, 8)	
Height of Specimen	height_specimen	decimal	(19, 8)	
Mass Material	mass_material	decimal	(19, 8)	
Mass Water	mass_water	decimal	(19, 8)	
Mass Water Added	mass_water_added	decimal	(19, 8)	
Percent Water Content	pct_water_content	decimal	(19, 8)	
Percent Water On Total	pct_water_total	decimal	(19, 8)	
Tare Mass Mold	tare_mass_mold	decimal	(19, 8)	
Tare Mass Pan	tare_mass_pan	decimal	(19, 8)	
Volume Per Linear	volume_per_linear	decimal	(19, 8)	
Volume of Specimen	volume_specimen	decimal	(19, 8)	
Wet Density of Specimen	wet_density_specimen	decimal	(19, 8)	
Wet Mass Of Pan & Specimen	wet_mass_pan_specimen	decimal	(19, 8)	
Wet Mass Specimen	wet_mass_specimen	decimal	(19, 8)	
Wet Mass Specimen & Mold	wet_mass_specimen_mold	decimal	(19, 8)	

Moisture-Density Relationship of Subgrade and Embankment Soils (DB-114-E)

Table Name: VALUE_DB114E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Dry Density Scale Max	dry_density_scale_max	decimal	(19, 8)	
Dry Density Scale Min	dry_density_scale_min	decimal	(19, 8)	
Dry Density Scale unit	dry_density_scale_unit	decimal	(19, 8)	

Hygroscopic Moisture	hygroscopic_moisture	decimal	(19, 8)	
Max Density (kg)	max_density_kg	decimal	(19, 8)	
Max Density (pcf)	max_density_pcf	decimal	(19, 8)	
Moisture scale max	moisture_scale_max	decimal	(19, 8)	
Moisture scale min	moisture_scale_min	decimal	(19, 8)	
Moisture scale unit	moisture_scale_unit	decimal	(19, 8)	
Optimum Moisture	optimum_moisture	decimal	(19, 8)	
Oven Dry Weight	oven_dry_weight	decimal	(19, 8)	
Soil Descript	soil_description	nvarchar	100	
Specific Gravity	specific_gravity	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Weight of Aggr., Pycn. & Water	weight_of_aggr	decimal	(19, 8)	
Weight of Pycnometer & Water	weight_of_pycnometer	decimal	(19, 8)	

Table Name: VALUE_DB114E_SPECIMEN **Maximum Rows: 4**

Field Description	Field Name	Datatype	Length	Values
Dry Density	dry_density	decimal	(19, 8)	
Dry Mass Material	dry_mass_material	decimal	(19, 8)	
Dry Mass Pan & Specimen	dry_mass_pan_specimen	decimal	(19, 8)	
Estimated Dry Density	est_dry_density	decimal	(19, 8)	
Height of Specimen	height_specimen	decimal	(19, 8)	
Mass Material	mass_material	decimal	(19, 8)	
Mass Water	mass_water	decimal	(19, 8)	
Mass Water Added	mass_water_added	decimal	(19, 8)	
Percent Water Content	pct_water_content	decimal	(19, 8)	
Percent Water Total	pct_water_total	decimal	(19, 8)	
Tare Mass Mold	tare_mass_mold	decimal	(19, 8)	
Tare Mass Pan	tare_mass_pan	decimal	(19, 8)	
Volume Per Linear mm	volume_per_linear	decimal	(19, 8)	
Volume of Specimen	volume_specimen	decimal	(19, 8)	
Wet Density of Specimen	wet_density_specimen	decimal	(19, 8)	
Wet Mass of Pan & Specimen	wet_mass_pan_specimen	decimal	(19, 8)	
Wet Mass Specimen	wet_mass_specimen	decimal	(19, 8)	
Wet Mass Specimen & Mold	wet_mass_specimen_mold	decimal	(19, 8)	

Nuclear Density and Moisture Determination (DB-115-1)

Table Name: VALUE_DB115_1 **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Density Count	density_count	int		
Density, %	density_pct	decimal	(19, 8)	
Pass/Fail	density_pct_pass_fail	nvarchar	100	
Max Density Specification Requirement	density_specification_req_max	decimal	(19, 8)	
Low Density Specification Req	density_specification_req_min	decimal	(19, 8)	
density_standard	density_standard	int		
Determined By Test Method	determined_by_test_method	nvarchar	100	{DB-113-E, DB-114-E}
Dry Density, pcf	dry_density_pcf	decimal	(19, 8)	
Gauge No.	gauge_no	nvarchar	100	
Maximum Dry Density	max_dry_density_pcf	decimal	(19, 8)	
Moisture Content, %	moisture_content_pct	decimal	(19, 8)	
Moisture Content Pct Pass or Fail	moisture_content_pct_pass_fail	nvarchar	100	{Pass, Fail}
Moisture Count	moisture_count	int		
Max Moisture Specification Requirement	moisture_specification_req_max	decimal	(19, 8)	
Low Moisture Specification Req	moisture_specification_req_min	decimal	(19, 8)	
Moisture Standard	moisture_standard	int		
Optimum Moisture Content	optimum_moisture_content_pct	decimal	(19, 8)	
Probe Depth	probe_depth	decimal	(19, 8)	
Soil Description	soil_desc	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Wet Density , pcf	wet_density_pcf	decimal	(19, 8)	

Soil /Aggregate Field Unit Weight Tests (DB-115-2)

Table Name: VALUE_DB115_2 **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Compaction, %	compaction_pct	decimal	(19, 8)	
Compaction Required	compaction_req_pct	decimal	(19, 8)	
Dry unit weight	dry_unit_weight	decimal	(19, 8)	
Dry Weight Total Moisture Sample	dry_weight_total_moisture	decimal	(19, 8)	
Final Weight Apparatus & Sand	final_weight_apparatus	decimal	(19, 8)	
Final Weight of Sand	final_weight_sand	decimal	(19, 8)	
Initial Weight Apparatus & Sand	initial_weight_apparatus	decimal	(19, 8)	

Initial Weight of Sand	initial_weight_sand	decimal	(19, 8)	
Maximum dry unit weight	max_dry_unit_weight	decimal	(19, 8)	
Moisture Required	moisture_req_pct	decimal	(19, 8)	
Optium Moisture (% if of dry unit weight)	optimum_moisture	decimal	(19, 8)	
Pass/Fail % Density	pass_fail_pct_density	nvarchar	100	
Pass/Fail % Moisture	pass_fail_pct_moisture	nvarchar	100	
% Moisture	pct_moisture	decimal	(19, 8)	
Sand bulk unit weight	sand_bulk_unit_weight	decimal	(19, 8)	
Soil Descript	soil_desc	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Total Volume-Sand Userd	total_volume	decimal	(19, 8)	
Volume of Hole	volume_hole	decimal	(19, 8)	
Volume of Surface	volume_surface	decimal	(19, 8)	
Weight of Material From Hole	weight_material_hole	decimal	(19, 8)	
Wet Unit Weight	wet_unit_weight	decimal	(19, 8)	
Wet Weight Total Moisture Sample	wet_weight_total_moisture	decimal	(19, 8)	

Test Resistance to Degradation By Wet Ball Mill Method (DB-116-E)

Table Name: VALUE_DB116E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Cumulative Method	cumulative_method	nvarchar	50	{Cumulative, Individual}
Total of 3000g weight retained	individual_weight_retained_3000g_total	decimal	(19, 8)	
Total of 3500g weight retained	individual_weight_retained_3500g_total	decimal	(19, 8)	
Percent Soil Binder	pct_soil_binder	decimal	(19, 8)	
Percent Soil Binder Increase	pct_soil_binder_increase	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Wet Ball Mill -No.40 Individual Percent Retained	wbm_individual_pct_retained_minusno40	decimal	(19, 8)	
Wet Ball Mill No.40 Individual Percent Retained	wbm_individual_pct_retained_no40	decimal	(19, 8)	
Wet Ball Mill Initial Weight	wbm_initial_weight	decimal	(19, 8)	
Wet Ball Mill Value	wbm_value	decimal	(19, 8)	
Wet Ball Mill -No.40 Weight Retained	wbm_weight_retained_minusno40	decimal	(19, 8)	

Wet Ball Mill No.40 Weight Retained	wbm_weight_retained_no40	decimal	(19, 8)	
Total of weight retained	weight_retained_total	decimal	(19, 8)	
Washed Sieve Analysis No.40 Individual Percent Retained	wsa_individual_pct_retained_no40	decimal	(19, 8)	
Washed Sieve Analysis -No.40 Individual Percent Retained	wsa_inidividual_pct_retained_minusno40	decimal	(19, 8)	
Washed Sieve Analysis Initial Weight	wsa_initial_weight	decimal	(19, 8)	
Washed Sieve Analysis -No.40 Weight Retained	wsa_weight_retained_minusno40	decimal	(19, 8)	
Washed Sieve Analysis No.40 Weight Retained	wsa_weight_retained_no40	decimal	(19, 8)	

Table Name: VALUE_DB116E_SIEVE **Maximum Rows: 7**

Field Description	Field Name	Datatype	Length	Values
Cumulative Percent Retained	cumulative_pct_retained	decimal	(19, 8)	
3000g Cumulative Weight Retained	cumulative_weight_retained_3000g	decimal	(19, 8)	
3500g Cumulative Weight Retained	cumulative_weight_retained_3500g	decimal	(19, 8)	
Individual Percent Retained	individual_pct_retained	decimal	(19, 8)	
3000g Individual Weight Retained	individual_weight_retained_3000g	decimal	(19, 8)	
3500g Individual Weight Retained	individual_weight_retained_3500g	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	
Weight Retained	weight_retained	decimal	(19, 8)	

Triaxial Compression Tests (DB-117-E)

Table Name: VALUE_DB117E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Average Corrected Strength, 00 psi	average_corrected_strength_0psi	decimal	(19, 8)	
Average Corrected Strength, 15 psi	average_corrected_strength_15psi	decimal	(19, 8)	
Classification	classification	nvarchar	100	
Cohesion, psi	cohesion_psi	decimal	(19, 8)	
Correlation Factor	correlation_factor	decimal	(19, 8)	
Grade, 00 psi	grade_0psi	nvarchar	100	
Grade, 15 psi	grade_15psi	nvarchar	100	
Internal Angle of Friction	internal_angle_friction	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Table Name: VALUE_DB117E_SPECIMEN **Maximum Rows: 8**

Field Description	Field Name	Datatype	Length	Values
Area, in.^2	area	decimal	(19, 8)	
Avg. Cross Sectional Area, in^2	avg_cross_sectional_area	decimal	(19, 8)	
Average Diameter, in.	avg_diameter	decimal	(19, 8)	
Corrected Stress, psi.	corrected_stress_psi	decimal	(19, 8)	
Dry Density of Specimen, pcf	dry_density_specimen_pcf	decimal	(19, 8)	
Final Weight of Stones	final_weight_stones	decimal	(19, 8)	
Height of Stone 1, in.	height_stone1	decimal	(19, 8)	
Height of Stone 2, in.	height_stone2	decimal	(19, 8)	
I-Strain, in./in.	i_strain	decimal	(19, 8)	
Initial Height of Specimen, in.	initial_height	decimal	(19, 8)	
Lateral Pressure, psi.	lateral_pressure_psi	decimal	(19, 8)	
New Height of Specimen, in.	new_height	decimal	(19, 8)	
Moisture of Specimen, %	pct_moisture_specimen	decimal	(19, 8)	
% Strain , in./in.	pct_strain	decimal	(19, 8)	
Uncorrected Stress, psi.	uncorrected_stress_psi	decimal	(19, 8)	
Weight of Specimen	weight_specimen	decimal	(19, 8)	
Weight of Stones and Specimen	weight_stones_specimen	decimal	(19, 8)	

Determining Soil pH (DB-128-E)

Table Name: VALUE_DB128E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Soil pH	soil_ph	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Measuring Resistivity of Soil Materials (DB-129-E)

Table Name: VALUE_DB129E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Resistance using resistivity meter	resistance_using_meter	decimal	(19, 8)	
Resistivity	resistivity_result	decimal	(19, 8)	
A= Area of one electrode	sbf_area	decimal	(19, 8)	
Distance between electrodes	sbf_distance	decimal	(19, 8)	
Soil Box Factor	sbf_factor	decimal	(19, 8)	

Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Measuring Thickness of Pavement Layer (DB-140-E)

Table Name: VALUE_DB140E **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Average Depth:	avg_depth	decimal	(19, 8)	
Depth 1:	depth_1	decimal	(19, 8)	
Depth 2:	depth_2	decimal	(19, 8)	
Depth 3:	depth_3	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

OVF HMAC Test Data: DB-200-F, DB-207-FPR, DB-227-F, DB-236-F, DB-207-F (DB-200/07/36)

Table Name: VALUE_DB207F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Specific Gravity of Asphalt Binder	specific_gravity	decimal	(19, 3)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Voids in Mineral Aggregate (VMA)	vma	decimal	(19, 1)	

Table Name: VALUE_DB207FPR **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Average Actual Specific Gravity (Ga):	GA	nvarchar	100	
Lab Molded Density, %:	LMD	decimal	(19, 8)	
Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB227F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Rice Specific Gravity (Gr):	rice_specific_gravity	decimal	(19, 8)	

Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB229F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB229F_SIEVE **Maximum Rows: 10**

Field Description	Field Name	Datatype	Length	Values
Current JMF	Current_JMF	nvarchar	100	
Design JMF	Design_JMF	nvarchar	100	
Adjusted Individual % Retained	pct	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	CVL

Table Name: VALUE_DB236F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Asphalt Content, %:	AC	decimal	(19, 8)	
Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Sieve Analysis of Non-Surface Treatment Aggregates (DB-200-F)

Table Name: VALUE_DB200F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Cumulative Weight Retained Minusno14	cumulative_weight_retained_minusno14	decimal	(19, 8)	
Dry Weight After Washing	dry_weight_after_washing	decimal	(19, 8)	
Limit As Percent	limit_as_percent	nvarchar	100	{Passing, Retained}
Original Dry Weight	original_dry_weight	decimal	(19, 8)	
Sieve Analysis Result 1	sieve_analysis_result1	nvarchar	100	
Sieve Analysis Result 2	sieve_analysis_result2	decimal	(19, 8)	
Sieve Analysis Result 3	sieve_analysis_result3	decimal	(19, 8)	
Sieve Analysis Result 4	sieve_analysis_result4	decimal	(19, 8)	
Sieving Loss	sieving_loss	decimal	(19, 8)	

Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Total Weight	total_weight	decimal	(19, 8)	
Washing Loss	washing_loss	decimal	(19, 8)	

Table Name: VALUE_DB200F_SIEVE **Maximum Rows: 12**

Field Description	Field Name	Datatype	Length	Values
Cumulative Percent Passing	cumulative_pct_passing	decimal	(19, 8)	
Cumulative Percent Retained	cumulative_pct_retained	decimal	(19, 8)	
Cumulative Weight Retained	cumulative_weight_retained	decimal	(19, 8)	
Individual Weight Retained	individual_weight_retained	decimal	(19, 8)	
Lower Limit Grading	lower_limit_grading	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	{2", 1-3/4", 1-1/2", 1-1/4", 1", 7/8", 3/4", 5/8", 1/2", 7/16", 3/8", 5/16", 1/4", No. 4, No. 6, No. 8, No. 10, No. 14, No. 16, No. 20, No. 30, No. 40, No. 50, No. 80, No. 100, No. 200 }
Upper Limit Grading	upper_limit_grading	decimal	(19, 8)	
Within Grading Limits	within_grading_limits	bit		

Sand Equivalent (DB-203-F)

Table Name: VALUE_DB203F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Average Sand Equivalent	average_sand_equivalent	decimal	(19, 8)	
Clay No.1 Reading	clay1_reading	decimal	(19, 8)	
Clay No.2 Reading	clay2_reading	decimal	(19, 8)	
Sand No.1 Calculated	sand1_calculated	decimal	(19, 8)	
Sand No.1 Reading	sand1_reading	decimal	(19, 8)	
Sand No.1 Reported	sand1_reported	decimal	(19, 8)	
Sand No.2 Calculated	sand2_calculated	decimal	(19, 8)	
Sand No.2 Reading	sand2_reading	decimal	(19, 8)	
Sand No.2 Reported	sand2_reported	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL

Tested Date	tested_date	smalldatetime		MM/dd/yyyy

QC/QA Test Data (DB-207-FPL)

Table Name: VALUE_DB207FPL **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
In Place Air Void, %	air_void	decimal	(19, 8)	
Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Deleterious Material & Decantation For Coarse Aggr (DB-217-F)

Table Name: VALUE_DB217F **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Original Weight Retained	part1_orig_weight_retained	decimal	(19, 8)	
Percent Deterious Material	part1_pct_deleterious_material	decimal	(19, 8)	
Sieve Size	part1_sieve_size	nvarchar	100	
Weight Deleterious Material	part1_weight_deleterious_material	decimal	(19, 8)	
Dry Weight after Washing	part2_dry_weight_after_washing	decimal	(19, 8)	
Percent Loss By Decantation	part2_loss_by_decantation	decimal	(19, 8)	
Original Weight Retained	part2_orig_weight_retained	decimal	(19, 8)	
Sieve Size	part2_sieve_size	nvarchar	53	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Sieve Analysis for Fine & Coarse Aggregate (DB-401-A)

Table Name: VALUE_DB401A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Equivalent Exceed 85	equivalent_exceed_85	bit		
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Total	total	decimal	(19, 8)	

Table Name: VALUE_DB401A_SIEVE **Maximum Rows: 8**

Field Description	Field Name	Datatype	Length	Values
Cumulative Percent Passing	cumulative_pct_passing	decimal	(19, 8)	
Cumulative Percent Retained	cumulative_pct_retained	decimal	(19, 8)	
Cumulative Weight Retained	cumulative_weight_retained	decimal	(19, 8)	
Individual Weight Retained	individual_weight_retained	decimal	(19, 8)	
Lower Spec Limit	lower_retained_spec_limit	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	
Upper Spec Limit	upper_retained_spec_limit	decimal	(19, 8)	
Within Master Grading	within_master_grading	varchar	20	

Table Name: VALUE_DB402A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Fineness Modulus	fineness_modulus	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Decantation Test For Concrete Aggregates (DB-406-A)

Table Name: VALUE_DB406A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Dry Mass After Washing	dry_mass_after_washing	decimal	(19, 8)	
Mass of Pycnometer Containing Sample and Water To Fill After Washing	mass_of_pycnometer_after_washing	decimal	(19, 8)	
Mass of Pycnometer Containing Sample and Water To Fill Before Washing	mass_of_pycnometer_before_washing	decimal	(19, 8)	
Mass of Pycnometer Filled With Water at Approx. Same Temperature as above	mass_of_pycnometer_with_water	decimal	(19, 8)	
Original Dry Mass of Sample	original_dry_mass	decimal	(19, 8)	
% Loss	percent_loss_part1	decimal	(19, 8)	
Percent Loss	percent_loss_part2	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Test By:	test_by	nvarchar	100	{Part I - Lab Method, Part II - Field Method}

Tested By	tested_by	nvarchar	100	CVL
Tested By - Part II	tested_by_part2	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Tested Date - Part II	tested_date_part2	datetime		MM/dd/yyyy

Organic Impurities in Fine Aggregate for Concrete (DB-408-A)

Table Name: VALUE_DB408A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Color of the Supernatant Liquid	color_of_supernatant_liquid	nvarchar	100	{LIGHTER THAN STANDARD, EQUAL TO STANDARD, DARKER THAN STANDARD}
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Deleterious Material (DB-413-A)

Table Name: VALUE_DB413A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Clay	clay_value1	decimal	(19, 8)	
Clay Percentage	clay_value2	decimal	(19, 8)	
Friable	friable_value1	decimal	(19, 8)	
Friable Percentage	friable_value2	decimal	(19, 8)	
Laminated	laminated_value1	decimal	(19, 8)	
Laminated Percentage	laminated_value2	decimal	(19, 8)	
Other	other_value1	decimal	(19, 8)	
Othesr Percentage	other_value2	decimal	(19, 8)	
Deleterious Material Retained	percent_deleterious_material_retained	decimal	(19, 8)	
Shale	shale_value1	decimal	(19, 8)	
Shale Percentage	shale_value2	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Total	total	decimal	(19, 8)	
Total Weight Sample	total_weight_sample	decimal	(19, 8)	

Field Form Concrete Sample - Cylinders (DB-418-A)

Table Name: VALUE_DB418A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Actual Water	actual_water	nvarchar	100	
Agg. Correction Factor	agg_correction_factor	nvarchar	100	CVL
Agg. Size	agg_size	nvarchar	100	CVL
Air Temperature	air_temperature	nvarchar	100	
Batch Size	batch_size	nvarchar	100	
Batch Time	batch_time	nvarchar	100	
Class of Concrete	class_of_concrete	nvarchar	100	CVL
Concrete Temperature	concrete_temperature	nvarchar	100	
Corrected Air Content	corrected_air_content	decimal	(19, 8)	
Design Water	design_water	nvarchar	100	
Mix ID	mix_id	nvarchar	100	
Placement Air	placement_air	decimal	(19, 8)	
Placement Slump	placement_slump	decimal	(19, 8)	CVL
Pump Air Loss	pump_air_loss	decimal	(19, 8)	
Pump Slump Loss	pump_slump_loss	decimal	(19, 8)	
Req. Strength	req_strength	nvarchar	100	
Sample Time	sample_time	nvarchar	100	
Average 7 Day Compressive Strength	seven_day_average	decimal	(19, 8)	
Slump	slump	decimal	(19, 8)	
Specimen Size	specimen_size	nvarchar	100	{4x8, 6x12}
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Ticket #	ticket_number	nvarchar	100	
Total Water	total_water	nvarchar	100	
Truck #	truck_number	nvarchar	100	
Average 28 Day Compressive Strength	twenty_eight_day_average	decimal	(19, 8)	
Unit Wt.	unit_weight	nvarchar	100	
Water Added	water_added	nvarchar	100	

Table Name: VALUE_DB418A_AVERAGE **Maximum Rows: 3**

Field Description	Field Name	Datatype	Length	Values
Average Age	average_age	nvarchar	100	
Average Strength	average_strength	decimal	(19, 8)	

Table Name: VALUE_DB418A_SPECIMEN **Maximum Rows: 7**

Field Description	Field Name	Datatype	Length	Values
Age(days)	age	nvarchar	100	CVL
Area	area	decimal	(19, 8)	
Load(lbs)	load_lbs	decimal	(19, 8)	
Pass/Fail	pass_fail	nvarchar	5	
Specimen	specimen	nvarchar	100	
Strength	strength	decimal	(19, 8)	
Test Date	test_date	smalldatetime		MM/dd/yyyy
Tested By	tested_by	nvarchar	100	CVL
Type Fracture	type_fracture	varchar	50	{A, B, C, D, E}

Determining Pavement Thickness By Direct Measurement (DB-423-A)

Table Name: VALUE_DB423A **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Measure Unit	measure_unit	nvarchar	100	{Inches, Millimeters}
Pavement Depth	pavement_depth	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB423A_LOCATION **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Average	average	decimal	(19, 8)	
Measurement 1	measurement_1	decimal	(19, 8)	
Measurement 2	measurement_2	decimal	(19, 8)	
Measurement 3	measurement_3	decimal	(19, 8)	
Measurement Identification / Location	measurement_id_location	nvarchar	100	

Direct Measurement of Bridge Deck Thickness (DB-423-A, Part II)

Table Name: VALUE_DB423B **Maximum Rows: 1**

Field Description	Field Name	Datatype	Length	Values
Stamp Code	stamp_code	nvarchar	100	CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB423B_BAY				Maximum Rows: 18
Field Description	Field Name	Datatype	Length	Values
Concrete Depth	concrete_depth	decimal	(19,4)	
Steel Depth	steel_depth	decimal	(19,4)	

Soil-Cement, Soil-Lime Testing (DB-120-E) ** INACTIVE **

Table Name: VALUE_DB120E — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Avg. Corrected Stress, psi:	avg_corrected_stress_psi	decimal	(19, 8)	
Percent Cement, (%)	percent_cement	decimal	(19, 8)	
Performed By DB-120-E:	performed_by	nvarchar	200	
Stamp Code	stamp_code	int		CVL
Target Percent Cement, %:	target_percent_cement	decimal	(19, 8)	
Target Stress, psi:	target_stress_psi	decimal	(19, 8)	
Tested By	tested_by	nvarchar	200	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Table Name: VALUE_DB120E_SPECIMEN — Maximum Rows: 3

Field Description	Field Name	Datatype	Length	Values
Area, in.^2:	area	decimal	(19, 8)	
Avg. Corrected Stress, psi:	avg_corrected_stress	decimal	(19, 8)	
Avg. Cross Sectional Area, in^2:	avg_cross_section_area	decimal	(19, 8)	
Average Diameter, in.:	avg_diameter	decimal	(19, 8)	
Circumference, in.:	circumference	decimal	(19, 8)	
Corrected Stress, psi.:	corrected_stress	decimal	(19, 8)	
Dead Load, lbs.:	dead_load	decimal	(19, 8)	
Deformation at Max Load, in.	deformation_at_max_load	decimal	(19, 8)	
Height of Stone 1, in.	height_stone1	decimal	(19, 8)	
Height of Stone 2, in.	height_stone2	decimal	(19, 8)	
I-Strain, in./in.:	i_strain	decimal	(19, 8)	

Initial Height of Specimen, in.:	initial_height_specimen	decimal	(19, 8)	
Lateral Pressure, psi.:	lateral_pressure	decimal	(19, 8)	
Max. Load Reading, div.	max_load_reading	decimal	(19, 8)	
New Height of Specimen, in.:	new_height_specimen	decimal	(19, 8)	
% Strain , in./in.:	pct_strain	decimal	(19, 8)	
Percent Cement, (%)	percent_cement	decimal	(19, 8)	
Ring Factor, lbs./div	ring_factor	decimal	(19, 8)	
Specimen Number:	specimen_no	int		
Uncorr'd Stress, psi.:	uncorrected_stress	decimal	(19, 8)	

Table Name: VALUE_DB121E — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Average Corrected Strength, 00 psi	average_corrected_strength_0psi	decimal	(19, 8)	
Average Corrected Strength, 15 psi	average_corrected_strength_15psi	decimal	(19, 8)	
Classification	classification	nvarchar	100	
Cohesion, psi	cohesion_psi	decimal	(19, 8)	
Correlation Factor	correlation_factor	decimal	(19, 8)	
Grade, 00 psi	grade_0psi	nvarchar	100	
Grade, 15 psi	grade_15psi	nvarchar	100	
Internal Angle of Friction	internal_angle_friction	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy

Table Name: VALUE_DB121E_SPECIMEN — Maximum Rows: 8

Field Description	Field Name	Datatype	Length	Values
Area, in.^2	area	decimal	(19, 8)	
Avg. Cross Sectional Area, in^2	avg_cross_sectional_area	decimal	(19, 8)	
Average Diameter, in.	avg_diameter	decimal	(19, 8)	
Corrected Stress, psi.	corrected_stress_psi	decimal	(19, 8)	
Dry Density of Specimen, pcf	dry_density_specimen_pcf	decimal	(19, 8)	
Final Weight of Stones	final_weight_stones	decimal	(19, 8)	
Height of Stone 1, in.	height_stone1	decimal	(19, 8)	
Height of Stone 2, in.	height_stone2	decimal	(19, 8)	
I-Strain, in./in.	i_strain	decimal	(19, 8)	
Initial Height of Specimen, in.	initial_height	decimal	(19, 8)	
Lateral Pressure, psi.	lateral_pressure_psi	decimal	(19, 8)	

New Height of Specimen, in.	new_height	decimal	(19, 8)	
Moisture of Specimen, %	pct_moisture_specimen	decimal	(19, 8)	
% Strain , in./in.	pct_strain	decimal	(19, 8)	
Uncorrected Stress, psi.	uncorrected_stress_psi	decimal	(19, 8)	
Weight of Specimen	weight_specimen	decimal	(19, 8)	
Weight of Stones and Specimen	weight_stones_specimen	decimal	(19, 8)	

Density of Asphalt Stabilized Base (DB-126-E) ** INACTIVE **

Table Name: VALUE_DB126E

Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Percent Asphalt in Mix(max)	asphalt_pct_max	decimal	(19, 8)	
Percent Asphalt in Mix(min)	asphalt_pct_min	decimal	(19, 8)	
Broken Method	broken_method	nvarchar	20	{Fast Break, Slow Break}
Date Broken(max)(max)	date_broken_max	smalldatetime		MM/dd/yyyy
Date Broken(min)	date_broken_min	smalldatetime		MM/dd/yyyy
Density of Specimen(max)	density_of_specimen_max	decimal	(19, 8)	
Density of Specimen(min)	density_of_specimen_min	decimal	(19, 8)	
Gauge Reading(max)	gague_reading_psi_max	decimal	(19, 8)	
Gauge Reading (min)	gague_reading_psi_min	decimal	(19, 8)	
Height of Specimen(max)	height_max	decimal	(19, 8)	
Height of Specimen(min)	height_min	decimal	(19, 8)	
Measured Weight(max)	measured_weight_max	decimal	(19, 8)	
Measured Weight(min)	measured_weight_min	decimal	(19, 8)	
Minimum Allowable Density	min_allowable_density	decimal	(19, 8)	
Minimum Percent Density	min_pct_density	decimal	(19, 8)	
Minimum Specimen Unconfined Compressive Strength	min_specimen_UCS	decimal	(19, 8)	
Mold Number(max)	mold_number_max	nvarchar	100	
Mold Number(min)	mold_number_min	nvarchar	100	
Date Molded(max)	molded_date_max	smalldatetime		MM/dd/yyyy
Date Molded(min)	molded_date_min	smalldatetime		MM/dd/yyyy
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Unconfined Compressive Strength (max)	UCS_max	nvarchar	100	
Unconfined Compressive Strength (min)	UCS_min	nvarchar	100	

Volume of Mold(max)	volume_of_mold_max	decimal	(19, 8)	
Volume of Mold(min)	volume_of_mold_min	decimal	(19, 8)	
Volume of Specimen(max)	volume_of_specimen_max	decimal	(19, 8)	
Volume of Specimen(min)	volume_of_specimen_min	decimal	(19, 8)	
Weight of Filters(max)	weight_of_filters_max	decimal	(19, 8)	
Weight of Filters(min)	weight_of_filters_min	decimal	(19, 8)	
Weight of Material(max)	weight_of_mat_max	decimal	(19, 8)	
Weight of Material(min)	weight_of_mat_min	decimal	(19, 8)	
Weight of Plates(max)	weight_of_plates_max	decimal	(19, 8)	
Weight of Plates(min)	weight_of_plates_min	decimal	(19, 8)	
Weight of Specimen(max)	weight_of_specimen_max	decimal	(19, 8)	
Weight of Specimen(min)	weight_of_specimen_min	decimal	(19, 8)	

Table Name: VALUE_DB200ST Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Sphalt	asphalt_pct	decimal	(19, 8)	
Dry Weight After Washing	dry_weight_after_washing	decimal	(19, 8)	
Moisture	moisture_pct	decimal	(19, 8)	
Original Dry Weight	orig_dry_weight	decimal	(19, 8)	
Total	pan_weight	decimal	(19, 8)	
Percent Difference	percent_difference	decimal	(19, 8)	
Sieving Loss	sieving_loss	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Total Weight	total_weight	decimal	(19, 8)	
Type	type	nvarchar	100	{A, B, C, D, E, L, PA, PB, PC, PD, PE, PL}
Washing Loss	washing_loss	decimal	(19, 8)	
Weight Difference	weight_difference	decimal	(19, 8)	
PrePan	weight_retained	decimal	(19, 8)	

Table Name: VALUE_DB200ST_SIEVE Maximum Rows: 8

Field Description	Field Name	Datatype	Length	Values
Cumulative Percent Passing	cumulative_percent_passing	decimal	(19, 8)	
Lower Retained Limit	lower_retained_limit	decimal	(19, 8)	
Cumulative Percent Retained	percent_retained_cumulative	decimal	(19, 8)	

Individual Percent Retained	percent_retained_individual	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	
Upper Retained Limit	upper_retained_limit	decimal	(19, 8)	
Cumulative Weight Retained	weight_retained_cumulative	decimal	(19, 8)	
Individual weight Retained	weight_retained_individual	decimal	(19, 8)	
Within Master Grading	within_master_grading	nvarchar	100	

Determining Flakiness Index (DB-224-F) ** INACTIVE **

Table Name: VALUE_DB224F — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Flakiness Index	flakiness_index	decimal	(19, 8)	
Number of Particles	num_particles_1	decimal	(19, 8)	
Number of Particles	num_particles_2	decimal	(19, 8)	
Number of Particles	num_particles_3	decimal	(19, 8)	
Number of Particles Passing for 1/4" slot	slot_1_4	decimal	(19, 8)	
Number of Particles Passing for 3/8" slot	slot_3_8	decimal	(19, 8)	
Number of Particles Passing for 5/32" slot	slot_5_32	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Total Particles	total_particles	decimal	(19, 8)	
Total Passing Particles	total_passing_particles	decimal	(19, 8)	

Table Name: VALUE_DB235F — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Average Percent of Draindown for Two Samples	avg_pct_draindown	decimal	(19, 8)	
Final Weight Plate	final_weight_plate_1	decimal	(19, 8)	
Final Weight Plate	final_weight_plate_2	decimal	(19, 8)	
Initial Sample Weight	init_sample_weight_1	decimal	(19, 8)	
Initial Sample Weight	init_sample_weight_2	decimal	(19, 8)	
Initial Weight Plate	init_weight_plate_1	decimal	(19, 8)	

Initial Weight Plate	init_weight_plate_2	decimal	(19, 8)	
Percent Of Draindown	pct_draindown_1	decimal	(19, 8)	
Percent Of Draindown	pct_draindown_2	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB410A — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Final Weight	final_weight	decimal	(19, 8)	
Initial Weight	initial_weight	decimal	(19, 8)	
La Abrasion Type	la_abrasion_type	nvarchar	100	CVL
La Abrasion Value	la_abrasion_value	decimal	(19, 8)	
Loss of Weight	loss_of_weight	decimal	(19, 8)	
Number of Spheres	number_of_spheres	int		
Percent Loss	percent_loss	decimal	(19, 8)	
Sieve	sieve	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Weight of Charge	weight_of_charge	nvarchar	100	

Table Name: VALUE_DB410A_SAMPLE — Maximum Rows: 4

Field Description	Field Name	Datatype	Length	Values
Actual Weight	actual_weight	decimal	(19, 8)	
Passing Sieve	passing_sieve	nvarchar	100	
Projected Weight	projected_weight	nvarchar	100	
Retained Sieve	retained_sieve	nvarchar	100	
Within Range	within_range	bit		

Table Name: VALUE_DB411M — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Normalized Individual Percent Retained Total	ni_pct_retained_total	decimal	(19, 8)	

% Loss Total	pct_loss_total	decimal	(19, 8)	
Soundness Loss	soundness_loss	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Weighted Average % Loss Total	weighted_avg_pct_loss_total	decimal	(19, 8)	

Table Name: VALUE_DB411M_CYCLE Maximum Rows: 5

Field Description	Field Name	Datatype	Length	Values
Cycle	cycle	nvarchar	5	
In Oven Date	in_oven_date	smalldatetime		MM/dd/yyyy
In Oven Time In	in_oven_time_in	smalldatetime		MM/dd/yyyy
In Oven Time Out	in_oven_time_out	smalldatetime		MM/dd/yyyy
In Solution Date	in_solution_date	smalldatetime		MM/dd/yyyy
In Solution Time In	in_solution_time_in	smalldatetime		MM/dd/yyyy
In Solution Time Out	in_solution_time_out	smalldatetime		MM/dd/yyyy
Out Oven Date	out_oven_date	smalldatetime		MM/dd/yyyy
Out Oven Time In	out_oven_time_in	smalldatetime		MM/dd/yyyy
Out Oven Time Out	out_oven_time_out	smalldatetime		MM/dd/yyyy
Out Solution Date	out_solution_date	smalldatetime		MM/dd/yyyy
Out Solution Time In	out_solution_time_in	smalldatetime		MM/dd/yyyy
Out Solution Time Out	out_solution_time_out	smalldatetime		MM/dd/yyyy
Remarks	remarks	nvarchar	250	

Table Name: VALUE_DB411M_PARTICLE Maximum Rows: 8

Field Description	Field Name	Datatype	Length	Values
Final Weight (g)	final_weight	decimal	(19, 8)	
Initial Weight (g)	initial_weight	decimal	(19, 8)	
Loss of Weight (g)	loss_of_weight	decimal	(19, 8)	
Normalized Individual Percent Retained	ni_pct_retained	decimal	(19, 8)	
% Loss	pct_loss	decimal	(19, 8)	
Particle Size Range Passing	size_range_passing	nvarchar	100	
Particle Size Range Retained	size_range_retained	nvarchar	100	
Weighted Average % Loss	weighted_avg_pct_loss	decimal	(19, 8)	

Testing Of Drilled Cores Of Portland Cement Concrete (DB-424-A, Part III) ** INACTIVE **

Table Name: VALUE_DB424A Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested By - Part II	tested_by_part2	nvarchar	100	CVL
Tested By - Part III	tested_by_part3	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Tested Date - Part II	tested_date_part2	datetime		MM/dd/yyyy
Tested Date - Part III	tested_date_part3	datetime		MM/dd/yyyy

Table Name: VALUE_DB424A_CORE — Maximum Rows: 4

Field Description	Field Name	Datatype	Length	Values
Age (Days)	age	int		
Compressive Strength	compressive_strength1	decimal	(19, 8)	
Compressive Strength	compressive_strength2	decimal	(19, 8)	
Diameter of Core (inches)	core_diameter1	decimal	(19, 8)	
Diameter of Core (inches)	core_diameter2	decimal	(19, 8)	
Length of Core (inches)	core_length1	decimal	(19, 8)	
Length of Core (inches)	core_length2	decimal	(19, 8)	
Core Number	core_number1	nvarchar	100	
Core Number	core_number2	nvarchar	100	
Failure Type	failure_type1	nvarchar	100	
Failure Type	failure_type2	nvarchar	100	
Max Load (Lbs)	max_load1	decimal	(19, 8)	
Max Load (Lbs)	max_load2	decimal	(19, 8)	

Table Name: VALUE_DB436A — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Average Diameter	avg_diameter	decimal	(19, 8)	
Diameter 1	measurement_1	decimal	(19, 8)	
Diameter 2	measurement_2	decimal	(19, 8)	
Diameter 3	measurement_3	decimal	(19, 8)	
Diameter 4	measurement_4	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	varchar	200	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Thickness	thickness	decimal	(19, 8)	

Volume of Cylinder	vol_cylinder	decimal	(19, 8)	

Concrete Sample - Beams (DB-448-A) ** INACTIVE **

Table Name: VALUE_DB448A — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Actual Water	act_water	decimal	(19, 8)	
Added Gal	added_gal	decimal	(19, 8)	
Agg. Correction Factor	agg_corr_factor	decimal	(19, 8)	CVL
Agg Size	agg_size	nvarchar	100	CVL
Air Temperature	air_temp	decimal	(19, 8)	
Batch Size	batch_size	decimal	(19, 8)	
Batch Time	batch_time	smalldatetime		MM/dd/yyyy
Class of Concrete	class_concrete	nvarchar	100	CVL
Concrete Temperature	concrete_temp	decimal	(19, 8)	
Corrected Air Content	corrected_air_content	decimal	(19, 8)	CVL
Design Water	des_water	decimal	(19, 8)	
Mix ID	mix_id	nvarchar	100	CVL
Qty Load	qty_load	decimal	(19, 8)	
Req. Strength, psi	req_strength	decimal	(19, 8)	
Sample Time	sample_time	smalldatetime		MM/dd/yyyy
Slump	slump	decimal	(19, 8)	CVL
Specimen Dimensions	spec_dimensions	nvarchar	100	CVL
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy
Ticket Number	ticket_num	decimal	(19, 8)	
Total Water	total_water	decimal	(19, 8)	
Truck Number	truck_num	decimal	(19, 8)	
Unit Weight	unit_weight	decimal	(19, 8)	

Table Name: VALUE_DB448A_SPECIMEN — Maximum Rows: 6

Field Description	Field Name	Datatype	Length	Values
Age	age	nvarchar	100	CVL
Avg Depth	avg_depth	decimal	(19, 8)	
Avg. Width	avg_width	decimal	(19, 8)	
Correction Factor	corr_factor	decimal	(19, 8)	
Max Load, lbs	max_load_psi	decimal	(19, 8)	
Mod Rupture	mod_rupture	decimal	(19, 8)	

Pass Fail	pass_fail	nvarchar	100	
Specimen	specimen	nvarchar	100	
Test Date	test_date	smalldatetime		MM/dd/yyyy
Tested By	tested_by	nvarchar	100	CVL

Table Name: VALUE_DB460A — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Number of Particles w/ one or no FF	number_of_particles_with_one	int		
Number of Particles w/ 2 or more FF	number_of_particles_with_two	int		
Number of Questionable Particles	number_of_questionable_particles	int		
Percent Crushed Particles	percent_crushed_particles	decimal	(19, 8)	
Percent Crushed Particles	percent_crushed_particles_result	decimal	(19, 8)	
Sieve Size	sieve_size	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	smalldatetime		MM/dd/yyyy
Total Number of Particles	total_number_of_particles	int		

Table Name: VALUE_DB530C — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Estimated Percent of Stripping	est_pct_stripping	nvarchar	100	
Stamp Code	stamp_code	int		CVL
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	datetime		MM/dd/yyyy

Table Name: VALUE_DB620J — Maximum Rows: 1

Field Description	Field Name	Datatype	Length	Values
Chloride (CL) (PPM)	chloride_ppm	decimal	(19, 8)	
Crucible + Residue Weight	crucible_residue_weight	decimal	(19, 8)	
Crucible Weight	crucible_weight	decimal	(19, 8)	
Ending	ending	decimal	(19, 8)	
Normality of AgNO3	normality_of_agno3	decimal	(19, 8)	

Residue Weight	residue_weight	decimal	(19, 8)	
Sample Weight	sample_weight_chloride	decimal	(19, 8)	
Sample Weight	sample_weight_sulfate	decimal	(19, 8)	
Stamp Code	stamp_code	int		CVL
Starting	starting	decimal	(19, 8)	
Sulfate (SO4) (PPM)	sulfate_ppm	decimal	(19, 8)	
Tested By	tested_by	nvarchar	100	CVL
Tested Date	tested_date	nvarchar	100	
Total	total	decimal	(19, 8)	

Appendix D – OVT Levels for Materials Testing Validation

Start-Up Requirements

During start-up operations, the CQAF (Construction Quality Acceptance Firm) and OV (owner verification) firm will perform split sample testing for all tests listed as Level 1 or Level 2. The OV firm will evaluate split sample results against TxDOT's split sample tolerance limits contained in Appendix B. For those test methods that do not validate during start-up operations, both the CQAF and OV firm will collaborate to determine the cause(s) of the non-validation and will both take appropriate corrective actions during the early phases of material production to align the testing operations. For tests listed as Level 3, the OV firm will observe and review the CQAF's initial start-up testing operations.

The level of significance (α) used for statistical analyses are provided below unless otherwise approved in writing by TxDOT.

MATERIAL CATEGORY	LEVEL OF SIGNIFICANCE (α)
Embankment, Subgrades, Backfill, and Base Courses	0.01
Asphalt Stabilized Base (Plant Mix)	0.01
Surface Treatments	0.01
Hydraulic Cement Concrete – Structural	0.025
Hydraulic Cement Concrete – Non Structural	0.01
Hydraulic Cement Concrete Pavements	0.025
Asphalt Concrete Pavement (Items 341, 342, 344, and 346)	0.025
Asphalt Concrete Pavement (Items 330 and 334)	0.01
Asphalt Concrete Pavement (Item 340)	0.025

Level 1 Tests: F & t-test and Split Samples

F- and t- Tests: The OV firm will perform continuous F- and t- test analyses on Level 1 tests with the OV testing frequency at approximately ten percent of the QA testing frequency. The continuous analysis, as described in Appendix I – I2MS 3.0 Continuous Analysis Algorithm, will be run daily with new OV test results being added to the OV sample population as older OV test results are removed. The analyses will be performed against the corresponding QA CQAF sample population.

Level 2 Tests: Independent Verification and Split Samples

Independent Verification: The OV firm will perform independent verification on Level 2 tests with the OV testing frequency once per quarter with lower frequency tests missed during one quarter being specifically targeted the next quarter. This verification shall be performed by comparing the independent OV test results with a group of corresponding QA test results as an independent check of the QA test results.

Level 3: Observation Verification

The OV firm will observe and review the CQAF's initial start-up testing operations and periodically during ongoing production operations to verify compliance with test procedures.

OVT Levels for Materials Testing Validation		Level 1	Level 2	Level 3
EMBANKMENTS, SUBGRADES, BACKFILL, AND BASE COURSES				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NO.**	**TxDOT RECOMMENDED**
EMBANKMENT (CUTS & FILLS)		Liquid Limit	Tex-104-E	2
		Plasticity Index	Tex-106-E	1
		Linear Shrinkage	Tex-107-E	2
		Gradation	Tex-110-E	2
		Moisture/Density	Tex-114-E	3
		In-Place Density	Tex-115-E (See NOTE)	1
RETAINING WALL (NON-SELECT BACKFILL)		Liquid Limit	Tex-104-E	2
		Plasticity Index	Tex-106-E	1
		Linear Shrinkage	Tex-107-E	2
		Gradation	Tex-110-E	2
		Moisture/Density	Tex-114-E	3
		In-Place Density	Tex-115-E (See NOTE)	1
RETAINING WALL (SELECT BACKFILL)		Gradation	Tex-110-E	2
		Resistivity	Tex-129-E	2
		pH	Tex-128-E	2
		Soundness	Tex-411-A	3
		In-Place Density	Tex-115-E (See NOTE)	1
UNTREATED BASE COURSES		Liquid Limit	Tex-104-E	2
		Plasticity Index	Tex-106-E	1
		Linear Shrinkage	Tex-107-E	2
		Gradation	Tex-110-E	2
		Moisture/Density	Tex-113-E	3
		Wet Ball Mill	Tex-116-E	2
		Triaxial	Tex-117-E	2
		In-Place Density	Tex-115-E (See NOTE)	1
		Moisture Content	Tex-103-E	2
		Thickness	Tex-140-E	1
TREATED SUBGRADE AND BASE COURSES	New Base Material	Liquid Limit	Tex-104-E	2
		Plasticity Index	Tex-106-E	1
		Linear Shrinkage	Tex-107-E	2
		Gradation	Tex-110-E	2
		Moisture/Density	Tex-113-E	3
		Wet Ball Mill	Tex-116-E	2
		Triaxial	Tex-117-E	2
		In-Place Density	Tex-115-E (See NOTE)	1
		Moisture Content	Tex-103-E	2
		Thickness	Tex-140-E	1
	Complete Mixture	Pulverization Gradation	Tex-101-E, Part III	2
		Moisture Content	Tex-103-E	2
		In-Place Density	Tex-115-E (See NOTE)	1
		Thickness	Tex-140-E	1

NOTE: OV Use of QA Proctors

- During startup operations, test 5 split samples with the QA and ensure that all values are within the split sample tolerance, currently set at 2.0 pcf of mean, as specified in Appendix B.
- The QA must provide OV lab with complete curve data for all proctor tests. Prior to testing in-place densities, QA shall furnish the selected curve for each in-place density point.
- The OV either agrees that the QA proctor is representative of the material being tested or the OV will obtain in-place density values and sample the material to conduct a one-point proctor to ensure that proctor values are within 2.0 pcf of curve estimates.

OVT Levels for Materials Testing Validation	Level 1	Level 2	Level 3

ASPHALT STABILIZED BASE (Plant Mix)

MATERIAL OR PRODUCT	TEST FOR	TEST NUMBER	TxDOT RECOMMENDED
AGGREGATE	Gradation	Tex-110-E	2
	Liquid Limit	Tex-104-E	2
	Plasticity Index	Tex-106-E	1
	Linear Shrinkage	Tex-107-E	2
	Wet Ball Mill or L. A. Abrasion	Tex-116-E or Tex-410-A	3
	Coarse Aggregate Angularity	Tex-460-A, Part I	3
	Sand Equivalent	Tex-203-F	3
	Decantation	Tex-217-F, Part II	2
COMPLETE MIXTURE	Laboratory Density and/or Strength	Tex-126-E	1
	Percent Asphalt	Tex-236-F	1
	In-Place Density	Tex-207-F	1
	Moisture Susceptibility	Tex-530-C	3
	Thickness	Tex-140-E	1

OVT Levels for Materials Testing Validation	Level 1	Level 2	Level 3

SURFACE TREATMENTS

MATERIAL OR PRODUCT	TEST FOR	TEST NUMBER	TxDOT RECOMMENDED
AGGREGATE	Gradation	Tex-200-F, Part I	1
	L. A. Abrasion	Tex-410-A	3
	Magnesium Soundness	Tex-411-A	3
	Pressure Slake	Tex-431-A	3
	Freeze Thaw	Tex-432-A	3
	Unit Weight	Tex-404-A	3
	24 hr Water Absorption	Tex-433-A	3
	Coarse Aggregate Angularity	Tex-460-A	2
	Deleterious Material	Tex-217-F	2
	Decantation	Tex-406-A	2
	Flakiness Index	Tex-224-F	3
	MicroDeval	Tex-461-A	3

OVT Levels for Materials Testing Validation		Level 1	Level 2	Level 3
HYDRAULIC CEMENT CONCRETE – STRUCTURAL (Classes: C, F, H, S, DC, CO, K, LMC, or SS)				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
MINERAL AGGREGATE	COARSE AGGREGATE	Decantation	Tex-406-A	2
		Sieve Analysis	Tex-401-A	2
		Deleterious Materials	Tex-413-A	2
		Los Angeles Abrasion	Tex-410-A	3
		5-cycle Magnesium Sulfate Soundness	Tex-411-A	3
	FINE AGGREGATE	Sand Equivalent	Tex-203-F	2
		Organic Impurities	Tex-408-A	2
		Sieve Analysis	Tex-401-A	2
		Fineness Modulus	Tex-402-A	2
		Deleterious Material	Tex-413-A	2
		Acid Insoluble Residue	Tex-612-J	3
	MINERAL FILLER	Sieve Analysis	Tex-401-A	3
CONCRETE		Compressive Strength	Tex-418-A	1
		Slump	Tex-415-A	2
		Entrained Air (When not waived by plans)	Tex-416-A or Tex-414-A	1
		Temperature of Concrete	Tex-422-A	3

OVT Levels for Materials Testing Validation	Level 1	Level 2	Level 3
HYDRAULIC CEMENT CONCRETE – NON-STRUCTURAL (Classes: A, B, D, or E)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
CONCRETE	Compressive Strength	Tex-418-A	3
	Entrained Air (When not waived by plans)	Tex-416-A or Tex-414-A	3

OVT Levels for Materials Testing Validation		Level 1	Level 2	Level 3
HYDRAULIC CEMENT CONCRETE PAVEMENTS (Classes: P, DC, CO, LMC, K, or HES)				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
MINERAL AGGREGATE	COARSE AGGREGATE	Decantation	Tex-406-A	2
		Sieve Analysis	Tex-401-A	2
		Deleterious Materials	Tex-413-A	2
		Los Angeles Abrasion	Tex-410-A	3
		5-cycle Magnesium Sulfate Soundness	Tex-411-A	3
	FINE AGGREGATE	Sand Equivalent	Tex-203-F	2
		Organic Impurities	Tex-408-A	2
		Sieve Analysis	Tex-401-A	2
		Fineness Modulus	Tex-402-A	2
		Deleterious Material	Tex-413-A	2
		Acid Insoluble Residue	Tex-612-J	3
	MINERAL FILLER	Sieve Analysis	Tex-401-A	3
CONCRETE		Strength	Tex-448-A or Tex-418-A	1
		Slump	Tex-415-A	2
		Entrained Air (When not waived by plans)	Tex-416-A or Tex-414-A	1
		Temperature	Tex-422-A	3
		Thickness	Tex-423-A	1

OVT Levels for Materials Testing Validation	Level 1	Level 2	Level 3

ASPHALT CONCRETE PAVEMENT (Items 341, 342, 344, and 346)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
COARSE AGGREGATE	L. A. Abrasion	Tex-410-A	3
	Magnesium Sulfate Soundness	Tex-411-A	3
	Gradation	Tex-200-F	3
	MicroDeval	Tex 461-A	3
	Flat and Elongated Particles	Tex-280-F	3
	Coarse Aggregate Angularity	Tex-460-A Part I	3
	Deleterious Material and Decant	Tex-217-F	3
RAP	Decant	Tex-217-F	3
	Plasticity Index	Tex-106-E	3
FINE AGGREGATE	Bar Linear Shrinkage	Tex-107-E	3
	Organic Impurities	Tex-408-A	3
	Gradation	Tex-200-F	3
MINERAL FILLER	Bar Linear Shrinkage	Tex-107-E	3
	Gradation	Tex-200-F	3
COMBINED AGGREGATE	Sand Equivalent	Tex-203-F	3
COMPLETE MIXTURE	Asphalt Content (%)	Tex-236-F	1
	Voids in Mineral Aggregates (VMA)	Tex-207-F	3
	Gradation	Tex-236-F	2
	Boil Test	Tex-530-C	3
	Indirect Tensile – Dry	Tex-226-F	3
	Moisture Content	Tex-212-F Part II	3
	Lab Molded Density	Tex-207-F	1
	Drain Down Test	Tex-235-F	3
	Hamburg Wheel Tracker	Tex-242-F	3
ROADWAY	In-Place Air Voids	Tex-207-F	1
	Segregation Profile	Tex-207-F Part V	3
	Joint Density	Tex-207-F Part VII	3
	Tack Coat Adhesion	Tex-243-F	3
	Thermal Profile	Tex-244-F	3
	Permeability	Tex-246-F Part I	3

OVT Levels for Materials Testing Validation	Level 1	Level 2	Level 3

ASPHALT CONCRETE PAVEMENT (Items 330 and 334)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
COARSE AGGREGATE	L. A. Abrasion	Tex-410-A	3
	Magnesium Sulfate Soundness	Tex-411-A	3
	Gradation	Tex-200-F	3
	MicroDeval	Tex-461-A	3
	Flat and Elongated Particles	Tex-280-F	3
	Coarse Aggregate Angularity	Tex-460-A Part I	3
	Deleterious Material and Decant	Tex-217-F	3
FINE AGGREGATE	Bar Linear Shrinkage	Tex-107-E	3
	Organic Impurities	Tex-408-A	3
	Gradation	Tex-200-F	3
MINERAL FILLER	Bar Linear Shrinkage	Tex-107-E	3
	Gradation	Tex-200-F	3
COMBINED AGGREGATE	Sand Equivalent	Tex-203-F	3
COMPLETE MIXTURE	Asphalt Content (%)	Tex-236-F	1
	Voids in Mineral Aggregates (VMA)	Tex-207-F	3
	Gradation	Tex-236-F	2
	Boil Test	Tex-530-C	3
	Moisture Content	Tex-212-F Part II	3
	Hydrocarbon-Volatile Content	Tex-213-F	3
	Lab Molded Density	Tex-207-F	1
	Hveem Stability	Tex-208-F	1
ROADWAY	Tack Coat Adhesion	Tex-243-F	3

ASPHALT CONCRETE PAVEMENT (Item 340)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
NOTE: Item 340 should be used only for maintenance activities.			

Appendix E
Test Methods for Personnel Qualifications

Test Procedure	TxAPA Soils and Flexible Base Testing Certifications
	Level SB 101
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part I & II)
Tex-103-E	Determining Moisture Content in Soil Materials
Tex-104-E	Determining Liquid Limit of Soils
Tex-105-E	Determining Plastic Limit of Soils
Tex-106-E	Calculating the Plasticity Index of Soils
Tex-107-E	Determining Bar Linear Shrinkage of Soils
Tex-110-E	Particle Size Analysis of Soils (Part I)
Tex-116-E	Ball Mill Method for Determining the Disintegration of Flexible Base Material
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
	Level SB 102
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part I & II)
Tex-103-E	Determining Moisture Content in Soil Materials
Tex-115-E	Field Method for Determining In-Place Density of Soils and Base Materials
Tex-140-E	Measuring Thickness of Pavement Layer
	Level SB 103
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part I & II)
Tex-128-E	Determining Soil pH
Tex-129-E	Measuring the Resistivity of Soils
Tex-145-E	Determining Sulfate Content in Soils, Colorimetric Method
Tex-146-E	Conductivity Test for Field Detection of Sulfates in Soil
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
	Level SB 201
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part I & II)
Tex-113-E	Laboratory Compaction Characteristics & Moisture-Density Relationship of Base Materials
Tex-114-E	Laboratory Compaction Characteristics & Moisture-Density Relationship of Subgrade & Embankment Soil
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
	Level SB 202
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part I & II)
Tex-117-E	Triaxial Compression for Disturbed Soils and Base Materials
Tex-120-E	Soil-Cement Testing
Tex-121-E	Soil-Lime Testing

Test Procedure	TxAPA Hot-Mix Asphalt Testing Certifications
	Level 1A
Tex-200-F	Sieve Analysis of Fine and Course Aggregate
Tex-205-F	Laboratory Method of Mixing Bituminous Mixtures
Tex-206-F	Compacting Specimens Using the Texas Gyratory Compactor (TGC)
Tex-207-F	Determining Density of Compacted Bituminous Mixtures
Tex-212-F	Determining Moisture Content of Bituminous Mixtures
Tex-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and Limestone Rock Asphalt
Tex-222-F	Sampling Bituminous Mixtures
Tex-225-F	Random Selection of Bituminous Mixture Samples
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
Tex-233-F	Preparing Control Charts for Asphaltic Concrete Paving Projects
Tex-236-F	Determining Asphalt Content of Asphalt Paving Mixtures by Ignition Method
Tex-241-F	Superpave Gyratory Compacting of Test Specimens of Bituminous Mixtures
Tex-500-C	Sampling Bituminous Materials, Pre-Molded Joint Fillers and Joint Sealers
Tex-530-C	Effect of Water on Bituminous Paving Mixtures
	Level 1B
Tex-207-F	Determining Density of Compacted Bituminous Mixtures
Tex-222-F	Sampling Bituminous Mixtures
Tex-239-F	Asphalt Release Agent
Tex-243-F	Tack Coat Adhesion
Tex-244-F	Thermal Profile of Hot Mix Asphalt
Tex-246-F	Permeability or Water Flow of Hot Mix Asphalt
Tex-1001-S	Operating Inertial Profilers and Evaluating Pavement Profiles
	Level 2
Tex-107-F	Determining Bar Linear Shrinkage of Soils
Tex-203-F	Sand Equivalent Test
Tex-204-F	Design of Bituminous Mixtures
Tex-205-F	Laboratory Method of Mixing Bituminous Mixtures
Tex-206-F	Compacting Specimens Using the Texas Gyratory Compactor (TGC)
Tex-207-F	Determining Density of Compacted Bituminous Mixtures (VMA Calculation)
Tex-217-F	Determining Deleterious Material and Decantation Test for Coarse Aggregates (Bituminous Mixtures) (Part I & II)
Tex-226-F	Indirect Tensile Strength Test
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
Tex-235-F	Determining Draindown Characteristics in Bituminous Materials
Tex-236-F	Determining Asphalt Content of Asphalt Paving Mixtures by Ignition Method
Tex-241-F	Superpave Gyratory Compacting of Test Specimens of Bituminous Mixtures
Tex-242-F	Hamburg Wheel-tracking Test
Tex-245-F	Cantabro Loss
Tex-280-F	Determining Flat and Elongated Particles
Tex-408-F	Organic Impurities in Fine Aggregate for Concrete
Tex-460-A	Determining Crushed Face Particle Count
Tex-461-A	Degradation of Coarse Aggregate by Micro-Deval Abrasion

Test Procedure	American Concrete Institute (ACI) Certifications
	Concrete Field Testing Technician – Grade I
Tex-407-A	Sampling Freshly Mixed Concrete
Tex-414-A	Air Content of Freshly Mixed Concrete by the Volumetric Method
Tex-415-A	Slump of Portland Cement Concrete
Tex-416-A	Air Content of Freshly-Mixed Concrete by the Pressure Method
Tex-417-A	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
Tex-422-A	Measuring Temperature of Freshly Mixed Portland Cement Concrete
Tex-447-A	Making and Curing Concrete Test Specimens (Part I)
	Concrete Strength Testing Technician
Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens
Tex-448-A	Flexural Strength of Concrete Using Simple Beam Third-Point Loading
Tex-450-A	Capping Cylindrical Concrete Specimens
	Concrete Laboratory Technician – Level I
Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens
Tex-448-A	Flexural Strength of Concrete Using Simple Beam Third-Point Loading
Tex-450-A	Capping Cylindrical Concrete Specimens

Appendix F
Test Methods for Split / Proficiency Evaluation

Requirements for Proficiency Testing

After observation and qualification, each qualified technician is required to participate annually in one proficiency or split sample test for each test method requiring independent assurance. Results must compare to the independent assurance test results to within the established tolerance as described in Appendix B – Split Sample Tolerance Limits. The following table describes the testing procedures required for proficiency evaluation.

Proficiency Testing Procedures	
Test Procedure	**Description**
Tex-104-E	Determining Liquid Limit of Soils
Tex-105-E	Determining Plastic Limit of Soils
Tex-106-E	Calculating the Plasticity Index of Soils
Tex-107-E	Determining the Bar Linear Shrinkage of Soils
Tex-110-E	Particle Size Analysis of Soils
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregate
Tex-206-F	Compacting Test Specimens of Bituminous Mixtures
Tex-207-F	Determining Density of Compacted Bituminous Mixtures
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
Tex-236-F	Determining Asphalt Content of Asphalt Paving Mixtures by the Ignition Method
Tex-414-A	Air Content of Freshly Mixed Concrete by the Volumetric Method
Tex-415-A	Slump of Portland Cement Concrete
Tex-416-A	Air Content of Freshly Mixed Concrete by the Pressure Method
Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens

Appendix G
Material Certification Example Letter

The intent of the material certification is to ensure that the quality of all materials incorporated into the project is in conformance with the plans and specifications, thus ensuring a service life equivalent to the design life. Any material represented by an acceptance test that does not meet the criteria contained in the plans and specifications is considered an exception. Exceptions should be investigated to determine if in fact the material is in reasonably close conformity with the plans and specifications. Nonconforming materials and workmanship will be tracked, monitored and appropriately addressed.

Submit a monthly CQAM Material Certification Letter in the FHWA Statistical Analysis Report. An example follows.

Date_____

To_____

From_____

Project No._____

RE: Monthly CQAM Material Certification

This is to certify that:

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications.

Exceptions to the plans and specifications are as follows:

1. Description
2. Description

_____
CQAM Signature Block

Appendix H
Minimum Qualification Requirements for Laboratories

All laboratories performing testing for TxDOT require qualification, at a minimum, in the test procedures identified in the tables below. Project-specific requirements may necessitate qualifications in additional test procedures. Qualification will be required through the AASHTO Accreditation Program (AAP) for those test methods identified in the tables below. The accreditation must be maintained throughout the life of the project and the laboratory must participate in the AASHTO Materials Reference Laboratory/Concrete and Cement Reference Laboratory (AMRL/CCRL) proficiency programs. In addition, TxDOT CSTM&P, or their designee, will qualify the laboratory in TxDOT test methods. The laboratory technicians must participate in the TxDOT Hot-Mix Asphalt and Soils statewide proficiency programs with the results documented as indicated in Section 4 of this manual.

SOIL			
ASTM	**AASHTO**	**TxDOT**	**Description**
D421	T87	TEX-101-E	Preparing Soil and Flexible Base Materials for Testing
D2216	T265	TEX-103-E	Moisture Content in Soil Materials
D4318	T89 / T90	TEX-104-106-E	Liquid Limit; Plastic Limit; Plasticity Index
D427	---	TEX-107-E	Bar Linear Shrinkage
---	T311	TEX-110-E	Particle Size Analysis
D1140	---	TEX-111-E	Amount of Material in Soils Finer than the 75 µm (No. 200) Sieve
D1557	T180	TEX-113-E	Compaction and Moisture-Density Relationship of Base Materials
D698	T99	TEX-114-E	Compaction and Moisture-Density Relationship of Subgrade, Embankment Soils, and Backfill Material
D6938	T310	TEX-115-E	Field Method for In-Place Density of Soils and Base Materials
---	---	TEX-116-E	Ball Mill Method for Disintegration of Flexible Base Material
---	---	TEX-117-E	Triaxial Compression for Disturbed Soils and Base Materials
D558	T134	TEX-120-E	Soil-Cement Testing
D5102	---	TEX-121-E	Soil-Lime Testing
---	---	TEX-124-E	Potential Vertical Rise
D4972	---	TEX-128-E	Soil pH
---	---	TEX-129-E	Resistivity of Soil Materials
---	---	TEX-140-E	Thickness of Pavement Layer
D2487	---	TEX-142-E	Laboratory Classification of Soils for Engineering Purposes
---	---	TEX-145-E	Sulfate Content in Soils— Colorimetric Method
---	---	TEX-146-E	Conductivity Test for Field Detection of Sulfates in Soil
D3740	---	TEX-198-E	Minimum Standards for Acceptance of a Laboratory (Soils/Base)
E329	---	---	Standard Specification for Inspection and Testing

HOT-MIX ASPHALT (HMA)			
ASTM	**AASHTO**	**TxDOT**	**Description**
D5444	T30	TEX-200-F	Sieve Analysis of Fine and Coarse Aggregates
D2419	T176	TEX-203-F	Sand Equivalent
D3203	T269	TEX-206-F	Compacting Specimens Using the Texas Gyratory Compactor
D2726	T166	TEX-207-F	Density of Compacted Bituminous Mixtures (SSD Method)
D6752	T331	TEX-207-F	Density of Compacted Bituminous Mixtures (Vacuum Method)
D1461	T110	TEX-212-F	Moisture Content
---	---	TEX-217-F	Deleterious Materials and Decantation for Coarse Aggregate
D75	---	TEX-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and Limestone Rock Aggregate
D979	---	TEX-222-F	Sampling Bituminous Mixtures
D6931	---	TEX-226-F	Indirect Tensile Strength
D2041	T209	TEX-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
D6307	T308	TEX-236-F	Asphalt Content by the Ignition Method
D3666	---	TEX-237-F	Minimum Standards for Acceptance of a Laboratory (HMA)
D6925	T312	TEX-241-F	Superpave Gyratory Compacting of Test Specimens
---	---	TEX-244-F	Thermal Profile of Hot Mix Asphalt
---	---	TEX-530-C	Effect of Water on Bituminous Paving Mixtures
E329	---	---	Standard Specification for Inspection and Testing

AGGREGATE			
ASTM	**AASHTO**	**TxDOT**	**Description**
C128	T84	TEX-201-F	Bulk Specific Gravity and Water Absorption of Fine Aggregate
C702	T248	TEX-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
C136	T27	TEX-401-A	Sieve Analysis of Fine and Coarse Aggregate
---	---	TEX-402-A	Fineness Modulus of Fine Aggregate
C127	T85	TEX-403-A	Saturated Surface-Dry Specific Gravity and Absorption
C117	T11	TEX-406-A	Material Finer than the 75 µm (No. 200) Sieve in Mineral Aggregate
C40	T21	TEX-408-A	Organic Impurities in Fine Aggregate for Concrete
C566	T255	TEX-409-A	Free Moisture and Water Absorption
C131	T96	TEX-410-A	Abrasion of Coarse Aggregate Using the Los Angeles Machine
C88	T104	TEX-411-A	Sodium or Magnesium Soundness
C142	T112	TEX-413-A	Deleterious Materials
D5821	---	TEX-460-A	Crushed Face Particle Count
C1077	---	TEX-498-A	Minimum Standards for Acceptance of a Laboratory (Concrete & Aggregate)
E329	---	---	Standard Specification for Inspection and Testing

HYDRAULIC CEMENT CONCRETE			
ASTM	**AASHTO**	**TxDOT**	**Description**
C172	T141	TEX-407-A	Sampling Freshly Mixed Concrete
C143	T119	TEX-415-A	Slump of Freshly Mixed Concrete
C231	T152	TEX-416-A	Air Content by the Pressure Method
C138	T121	TEX-417-A	Unit Weight, Yield, and Air Content (Gravimetric)
C39	T22	TEX-418-A	Compressive Strength of Cylinders
C1064	T309	TEX-422-A	Temperature of Freshly Mixed Portland Cement Concrete
---	---	TEX-423-A	Pavement Thickness by Direct Measurement
C31	T23	TEX-447-A	Making and Curing Specimens
C617	T231	TEX-450-A	Capping Specimens
C1231	---	TEX-450-A	Unbonded Caps
C1077	---	TEX-498-A	Minimum Standards for Acceptance of a Laboratory (Concrete & Aggregate)
E329	---	---	Standard Specification for Inspection and Testing

	Preferred test procedure for AASHTO Accreditation
	Acceptable test procedure for AASHTO Accreditation
	Test procedure qualified by TxDOT CSTM&P, or designated IA Laboratory

Appendix I
I2MS 3.0 Continuous Analysis Algorithm

The following describes the I2MS 3.0 algorithm used in the continuous statistical analysis referenced in Appendix D – OVT Levels for Materials Testing Validation.

Categorizing For Analysis
When a test version record is saved to I2MS, the first step is to assign it to any applicable analysis categories. A test record must have Sample Type "Random-Independent" or "Random-Split" to be associated with any category.[1] Assignment to a category is done immediately when the record enters the system, but the record will not be included in any analyses until it is set "For Analysis" (i.e. it is Approved or intermediate break data is Reviewed).

Note: A new version of an existing record can actually belong to a different analysis category than a previous version if the header values were changed. This is not a problem, as an analysis run represents a snapshot of the current data in the system at the time the analysis was done.

Finding Categories to Analyze
Every night, I2MS scans data in the system for categories that need to be analyzed. A category is triggered for analysis whenever a NEW OV record appears. A record is new if it is For Analysis and has never been analyzed before. Some examples of new OV records are:

- A test was added and approved today.
- A test was added a month ago and approved/reviewed today.
- A test that was added and analyzed last week was revised and reapproved. This new version has never been analyzed, so it will trigger an analysis the same as if it were the first version of the record.

Analyzing a Category
The first step in the analysis is to find the date range of the analysis populations. The age of a record is determined by its SAMPLED DATE.

I2MS has a desired maximum number of days that can be configured in Project Settings. By default, this is 90 days. Also configurable is the desired maximum number of OV records to include in one analysis run. This defaults to 25 records.

The end date of analysis will always be the current date. The start date of the analysis is determined by the following:

- If there is an unanalyzed record for either the OVF or CQAF that is OLDER than 90 days, the start date is that record's Sampled Date. We will analyze ALL records from that date forward.
- If there are less than 25 OV records within the last 90 days, the start date will be 89 days before the current date (i.e. 90 days total in the analysis).

[1] These restrictions can be reconfigured at the analysis-group level (e.g. Concrete, Asphalt, etc.) if the list of Sample Types or the business rules change.

- If there are 25 OV records or more within the last 90 days, we will use a smaller date range. The Sampled Date of the 25th OV record back from the current date will be the start date of the analysis.

The next step is to pull all of the data points for the analysis. We pull values for all "For Analysis" OV and CQAF records between the start date and the end date, using ONLY the latest versions of those records.

Last, we perform the F and t statistical analysis and save the P-values for review by the materials manager. The analysis requires at least two points from each population to calculate. If there are less than two data points for either OV or CQAF, we skip the analysis. The category will be picked up again the next time an approved OV record comes in.

Appendix J
Archived Versions

The following archived versions of this document are available:

- Effective November 24, 2008–February 28, 2010:
  ftp://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_1108.pdf

- Effective March 1, 2010–May 10, 2010:
  ftp://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_0310.pdf

- Effective May 11, 2010–July 24, 2011:
  ftp://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_0510.pdf