QUALITY ASSURANCE PROGRAM

FOR

VERMONT AGENCY OF TRANSPORTATION

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1.0 INTRODUCTION

The *Quality Assurance Program* (*QAP*) will provide a set of practices for construction inspection and compliance in accordance with the Code of Federal Regulations (CFR) Parts 635 and 637. The specific elements of this program include Contractor Quality Control, Acceptance, Independent Assurance, certification and qualification of personnel and laboratories, and clarification and resolution of material test results.

This set of practices is directly related to the level of risk, material quality, public safety, and project scope and funding requirements associated with each transportation construction project. Toward this end, the *QAP* is organized into four levels (refer to Section 4.4 for further information). Each project will be addressed at only one level.

The *QAP* and the *Materials Sampling Manual* (*MSM*) have been developed to clearly articulate the processes for *acceptance* of materials in construction and maintenance.

This document is written primarily for use by the Vermont Agency of Transportation (Agency) personnel, or designated representatives, who administer projects that involve construction or maintenance of the Vermont highway system. However, consideration has been given to present terms or wording in the document that would allow for both an effective and efficient use of this document by other public, non-profit, or private sector entities. Given this consideration when the term "Owner" is used it implies, or is in reference to, the owner of the facility. When the term "Agency" is utilized it is in sole reference to the State of Vermont, and more specifically the Agency of Transportation, and is not intended to be interpreted as anything different. Furthermore, this document can not be used to diminish the statutory authority and responsibilities of the State of Vermont or the Vermont Agency of Transportation.

2.0 POLICY

This *QAP* identifies the various elements of the Owner's sampling, testing, and inspection programs that are in place to assure that the materials and workmanship incorporated into construction projects are in conformity with the requirements of the approved plans and specifications including approved changes. It is the intent of the Owner, to the extent possible, that all sampling will be performed in a random manner. In addition, the *QAP* will be periodically reviewed and revised to ensure that its contents reflect current Agency policies and practices while continuing to meet the criteria contained in the Code of Federal Regulations (CFR) Title 23 Section 637 Subpart B.

The purpose of the *QAP* can be found within the 23 CFR 637.105(a) and 635.205(a) as follows:

23 CFR 635.105) Supervising Agency. (a)The STD [State Transportation Department, in this case the Vermont Agency of Transportation] *has responsibility for the construction of all Federal-aid projects, and is not relieved of such responsibility by authorizing performance of the work by a local public agency or*

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other Federal agency. The STD shall be responsible for insuring that such projects receive adequate supervision and inspection to insure that projects are completed in conformance with approved plans and specifications.

23 CFR 637.205 Quality Assurance Program. (a) Each STD shall develop a quality assurance program which will assure that the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS are in conformity with the requirements of the approved plans and specifications, including approved changes. The program must meet the criteria in §637.207 and be approved by the FHWA.

In addition to complying with the requirements of 23 CFR 637.205(a) each STD is directed to comply with additional requirements in 23 CFR 637.205, including maintaining adequate and qualified staff to administer its *QAP* and maintaining a *central laboratory* meeting the requirements of 23 CFR 637.209(a)(2). Another requirement of 23 CFR 637.205 stipulates that *Independent Assurance* samples and tests or other procedures will be performed by qualified sampling and testing personnel employed by the Agency, or its designated Agent. It also requires that all samples used for *quality control* or acceptance sampling and testing purposes will be random samples.

The Vermont Agency of Transportation, through the Materials Testing and Certification Section, maintains and monitors a sampling and testing program that consists of two parts:

a) An *Acceptance program* which conforms to 23 CFR 637.207(a)(1) and,
b) An *Independent Assurance program* which conforms to 23 CFR 637.207(a)(2) in which samples are systems based.

It is understood that the Agency's *MSM* will meet the requirements of 23 CFR 637.207. The *MSM* provides documentation of sampling frequency guide schedules, identification of sampling locations in the construction operation and identification of tests to be performed. It is current Agency policy that *quality control* sampling and testing results are not to be used in the Acceptance process for Level 1, 2, and 3 projects with the exception of design-build projects.

In addition, the Agency's *QAP* applies to all VTrans' Design-Build projects. Each Design-Build project will have a separate project-specific acceptance sampling and testing plan that will be developed based on the site-specific risks associated with the project.

3.0 TERMINOLOGY

Table 3.1 provides an outline of equivalent titles and terminology for situations in which the QAP may be used to guide projects being administered by parties other than the VTrans Construction section.

Table 3.1: Equivalency of Terms

Default: For projects administered by the VTrans Construction Section;	For projects administered by VTrans Maintenance, it may mean;	For projects administered by a Municipality, it may mean	For projects administered by a V.S.A. Section 1111 permit holder;
Chief Engineer (Agency Division Director)	Chief Engineer (Agency Division Director)	Facility Owner's representative	Facility Owner's representative
Agency Representative (Resident Engineer)	District Project Manager	Municipality's Representative	Owner's representative
Construction Engineer	District Transportation Administrator (DTA)	Municipality's Representative	Owner's representative
Materials Manager	District Transportation Administrator (DTA)	Municipality's Representative	Owner's representative
Regional Construction Engineer	District Transportation Administrator (DTA)	Municipality's Representative	Owner's representative
Structures Engineer	District Transportation Administrator (DTA)	Municipality's Representative	Owner's representative
Owner (VTrans)	VTrans	Municipality's Representative	Permit Holder or Owner's representative

Where the term "Project" is referenced, it may mean the work conducted by a Contractor on a state owned facility, or the work conducted in accordance with a Title 19 V.S.A. Section 1111 permit on a state owned facility, or the work being accomplished by a municipality pursuant to a signed Cooperative Agreement with the Agency's Municipal Assistance Bureau.

Where the term Transportation Board is referenced, it may mean Transportation Board, Municipal Selectboard, Council, Board of Trustees or Sponsor Board of Trustees.

3.1 Definitions

Acceptance

The determination to allow materials and work incorporated into a project to remain in the project with or without payment being made to the *Contractor*.

Acceptance Program

A thorough and consistent evaluation of all factors that are to be used by the Owner to determine the level of quality and the acceptability of the product or work as specified in the contract requirements. These factors include, but are not necessarily limited to, *material certifications*, *acceptance sampling and testing,* and inspection.

Acceptance Sampling and Testing

Sampling, testing, and the assessment of test results to determine that the quality of produced material or construction is acceptable, in terms of the specifications.

Access Management Program

The VTrans Access Management Program outlines an access classification system and standards to ensure consistency in the permitting process. The standards for each category provide VTrans with the parameters necessary to apply consistent permitting conditions based on a uniform classification system of all State Highways.

Accredited Laboratory

It is a laboratory that is accredited by AASHTO Re:source.

Agency Laboratory

An Agency-owned laboratory other than the c*entral laboratory* where *acceptance* samples are processed by Agency personnel or representatives.

Consultant Laboratory

An Independent Laboratory in which independent and *certified personnel* process samples.

Central Laboratory

The Agency's primary laboratory is an AASHTO *accredited laboratory* located in Berlin, Vermont.

Certified Personnel

Any person determined certified by an appropriate certification program, as determined by the Owner.

Clarification and Resolution of Material Test Results

The procedure, see Section 9.0, used to resolve disagreements between the Owner and its *Contractor* regarding material quality and material test results.

Confirmation

The act of determining whether the product supplied matches the product identified in the material certification submitted.

Contractor

The individual, partnership, firm, corporation, any acceptable combination thereof, or a joint venture which is a party to the Contract with the Owner which is undertaking the performance of the work under the terms of the Contract and acting directly or through its agent(s) or employee(s). The term "*Contractor*" means the prime *Contractor* as differentiated from a *Subcontractor*.

Contractor Laboratory

A laboratory which may be owned and/or operated by a *Producer or Contractor*. This laboratory may be located on a construction site for the purpose of processing *Acceptance* or *quality control* samples.

Highway System Policy Plan

The Highway System Policy Plan (HSPP) takes a broad look at current and likely future highway system conditions and needs. It provides a high-level, strategic view to guide the Vermont Agency of Transportation in preserving, maintaining and enhancing the highway network over the next 20 years.

Independent Assurance (IA) Comparison

The act of evaluating the variation between the Acceptance and IA test results. The results of a comparison are documented in an IA Comparison Report.

Independent Assurance (IA) Sampling and Testing

Sampling and testing that is conducted by the Independent Assurance (IA) Unit of the Materials Section to provide an unbiased and independent evaluation of the Acceptance Program.

Independent Assurance (IA) Program

Unbiased activities that are performed by *qualified personnel* that are not directly responsible for *quality control* or *acceptance*. These activities provide for an independent assessment of equipment, and evaluation of the sampling and testing methods employed during the *Acceptance Program* to ensure conformance with established procedures. Test results of IA tests are not to be used as basis of material *acceptance*.

Lot

A defined quantity of material from a single source assumed to be produced and/or placed essentially by the same controlled process.

Manufacturer

A company that manufactures and supplies *standard manufactured materials* or fabricated materials for use on a project.

Material Certifications

Documents submitted to certify the product used in the work conforms to all applicable requirements of the Owner's standard specifications, drawings, and contract provisions for the intended project.

National Highway System

The *National Highway System* (NHS) includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. The NHS was developed by the United States Department of Transportation (USDOT) in cooperation with the states, local officials, and metropolitan planning organizations (MPOs).

Population

All of the specimens obtained from a *lot* that are used to represent the entire *lot* of material.

Project Management Team

The team responsible for performing a technical assessment and making recommendations to aid in determining the inspection level of projects.

Project of Division Interest (PoDI)

The PoDIs are those projects that have an elevated risk, contain elements of higher risk, or present a meaningful opportunity for FHWA involvement to enhance meeting program or project objectives. FHWA will assert a positive leadership influence to help assure a high level of public confidence that projects and programs are administered with integrity, are in compliance with applicable requirements, and yield maximum value for the public.

Producer

A company that produces or fabricates materials for use on a specific project (i.e. Aggregate, Hot Mix Asphalt (HMA), Portland Cement Concrete (PCC), Precast/Prestressed Concrete) by either the *Contractor* or *Subcontractor*.

Qualified Laboratory

A laboratory that has been deemed 'qualified' by the Agency in accordance with the requirements of the Qualified Laboratory Program.

Qualified Personnel

Owner personnel that have successfully completed the Agency's Qualified Technician Program or an Owner-approved qualified technician program.

Quality Assurance Program

A program which will assure that the materials and workmanship incorporated into each Federal-aid highway construction project on the NHS are in conformity with the requirements of the approved plans and specifications, including approved changes. The program must meet the criteria in 23 CFR Sec. 637.207, and be approved by the FHWA.

Quality Characteristics

The specific material properties evaluated by *quality control* and *acceptance sampling and testing.*

Quality Control

All contractor/vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements

Quality Control Plan

A detailed document prepared by the *Contractor* or *Producer* identifying the processes that will be used to ensure the quality of the material.

Referee Sample

A *split* or *replicate sample* that is taken, prepared and stored in an agreed upon manner for the purpose of settling a dispute.

Replicate Samples

Two or more material samples taken at the same location and time. These samples are taken to estimate sampling and testing variability.

Split Sample

A split sample is a single material sample that has been divided into two or more portions. These samples are taken to estimate testing variability.

Standard Manufactured Materials

These are items produced routinely (i.e. not for a specific project) by a *Manufacturer*.

Subcontractor

An individual or legal entity to whom or which the *Contractor* sublets part of the work.

Validation

The process of comparing two independently obtained sets of test results to determine whether they came from the same *population*.

3.2 Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACL	Advance Certification List
APL	Approved Product List
CFR	Code of Federal Regulations
DMFD	District Maintenance and Fleet Division
FHWA	Federal Highway Administration
HMA	Hot Mix Asphalt
IA	Independent Assurance
MAS	Municipal Assistance Section
MAP	Material Acceptance Program
MAU	Materials Acceptance Unit
MSM	Material Sampling Manual
NHS	National Highway System
PCC	Portland Cement Concrete
QA	Quality Assurance
QAP	Quality Assurance Program
QC	Quality Control
QCP	Quality Control Plan
SHS	State Highway System
UCP	Umbrella Certification Program
V.S.A	Vermont Statutes Annotated

4.0 LEVEL DETERMINATION

There are four inspection levels identified in Section 4.4. There are four different project characteristics that are used to assist in the determination of the appropriate inspection level. The project-specific characteristics are:

1. Degree of FHWA oversight
2. Project funding source
3. Highway system on which the project lies
4. Scope of work/project risk

These inspection levels may be subject to change, either up or down, based on a technical assessment performed and recommendations made by the Project Management Team. Projects shall be assigned to the highest level applicable unless a lower level of inspection is agreed upon by the Project Management Team and the Materials Manager.

Section 4.4, QAP Inspection Level Determination, shall be used to determine the most appropriate inspection level for each project under the Owner's jurisdiction. Projects that are entirely privately or locally funded and which do not impact the State Highway System are outside the scope of this document.

4.1 FHWA Projects of Division Interest (PoDI)

Projects of Division Interest are subject to FHWA oversight. FHWA oversight is the compliance, or verification component of FHWA stewardship activities. FHWA oversight can be defined as follows:

> *FHWA oversight is the act of ensuring that the Federal highway program is delivered consistent with laws, regulations and policies by direct FHWA involvement in project review activity.*

Projects of Division Interest are classified as Level 1 projects regardless of the funding source or highway system, unless the particular item of FHWA interest for the project in question does not warrant this default elevation of the project inspection level.

4.2 Primary Funding

A funding source as mentioned herein is defined as the origin of the monies used for highway construction and maintenance. Funding sources are commonly federal, state, or local governments

or combinations thereof. Other funding sources might be entities - such as private utilities, property owners, businesses, or other non-governmental entities. Identifying the project's funding sources is integral to determining the appropriate inspection level as outlined in Section 4.4.

4.3 Highway Systems

4.3.1 State Highway System

The *State Highway System* (SHS) as defined in Vermont's *Highway System Policy Plan,* represents the entire set of highways that are under the Agency's jurisdiction. Class 1 Town Highways are not on the SHS but they are extensions of the state highway system through towns and represent an important complement to this system. These Class 1 facilities are owned and operated by municipalities. These segments create a continuous system of routes that are used for intrastate travel, even if they are not directly under Agency jurisdiction.

4.3.2 National Highway System

The *National Highway System* (NHS) in Vermont consists of 320 miles of Interstate highways, 407 miles of principal arterials, and 9.5 miles of intermodal connectors. A brief description of these subsystems is included below:

- **Interstate:** The Eisenhower Interstate System of highways retains its separate identity within the NHS.
- **Other Principal Arterials:** These are highways in rural and urban areas which provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facilities.
- **Intermodal Connectors:** These highways provide access between major intermodal facilities and the National Highway System. A list of these intermodal connectors can be found in the Agency's Highway System Policy Plan.

4.4 QAP Inspection Level Determination

The list below will help determine what inspection level should be used for a project:

Level 1

- PoDI projects (See Note 1)
- NHS projects with federal funding

Level 2

- NHS projects with no federal funding
- SHS projects with federal and/or state funding on the SHS
- High risk Class I town highway or bridges (See Note 2)
- Utilities Section Issued 19 V.S.A. 1111 Access Permit on NHS, SHS, or Class I THs or bridges

Level 3

- Local road projects with federal and/or state funding
- Low risk Class I THs or bridges (See Note 2)
- Utilities Section Issued 19 V.S.A. 1111 Access Permit on local roads

Level 4

- All projects administered by the DMFD

Projects that do not fall within any of the categories listed above are subject to level determination by the Owner.

NOTES:

1.) If the particular element of FHWA interest for the project in question does not warrant this default elevation of the project inspection level, then the project inspection level may be determined using the remaining factors of location, funding source, and risk level. For example, a PoDI in which the FHWA project element of interest is utility permitting would not necessitate an increase in the project inspection level.

2.) High risk projects include, but are not limited to, projects with a scope of work that include items such as slope stabilization, bridge work, road re-construction, and installation of mast arm foundations and culverts.
Low risk projects include most enhancement projects such as sidewalks and bike paths (w/o bridges), pavement marking, and resurfacing projects.

5.0 LEVEL 1, 2, and 3 PROJECTS

5.1 Introduction

The terminology used herein refers to specific position descriptions, documents, and processes as they apply to projects under construction by the Vermont Agency of Transportation Highway Division. It is recognized that there will also be projects administered by the VTrans District Maintenance and Fleet Division (DMFD), local municipalities in cooperation with the Agency's Municipal Assistance Section (MAS), or private entities that will use this document as well.

Personnel from these agencies or private entities may be responsible for ensuring that the Title 19 V.S.A. 1111 permit conditions identified in the issued permits are achieved. It is the responsibility of the Title 19 V.S.A. 1111 Permitting or Contracting Authority to verify that their personnel, process, and documentation meet the general requirements as outlined herein.

Where deemed necessary for clarity, a brief description of the general requirements (in italics) is provided followed by an explanation of how the typical Agency project will be administered.

5.2 Owner Acceptance Program

5.2.1 Acceptance Sampling and Testing

Materials incorporated into highway construction projects shall be subject to *acceptance sampling and testing*, as well as *Quality Control (QC)* sampling and testing as required by the contract. Owner personnel conducting *acceptance sampling and testing* shall, as a minimum, be *qualified technicians.* Qualified technicians must satisfy the requirements for Qualified Technician as defined in the Agency's Qualified Technician Program (QTP). Non-Owner personnel conducting *acceptance sampling and testing* shall be certified. Laboratory acceptance testing must be performed in a qualified laboratory. Qualified laboratories must satisfy the requirements for Qualified Laboratory as defined in the Agency's Qualified Laboratory Program (QLP).

As a minimum, *acceptance sampling and testing* is to be conducted in accordance with the Frequency Guide Schedules found in the Agency's Material Sampling Manual (MSM) that correspond with the QAP inspection level. **The Owner reserves the right to sample or**

test more frequently if deemed necessary to ensure material quality. As indicated in the MSM, sampling locations may vary.

For Quality Assurance (QA) items of work (i.e. those contract items that have statistically-based pay factors tied to acceptance), the Contract and the MSM guidance shall apply. All *acceptance sampling and testing* will be conducted in accordance with the procedures outlined in the Agency's MSM.

In case of a conflict between Contract requirements and the MSM, the Contract shall govern.

The Owner reserves the right to sample and test any materials on its projects or for those projects issued permits for work to be accomplished on state-owned facilities. For MAS projects, *acceptance sampling and testing* may be performed by the Agency or a *qualified laboratory* meeting the requirements of the Agency's Qualified Laboratory Program.

For Title 19 V.S.A 1111 permits, it is the responsibility of the Permittee to ensure that all materials are sampled and tested in accordance with the conditions of the permit. Materials testing must be conducted by a *qualified laboratory*.

5.2.2 Determination of Acceptance

The designated Agency Representative (Resident Engineer, Project Engineer, or other agency representative) is responsible for *Acceptance* of the materials and work accomplished on or within the Owner's right-of-way, or of any work that will become the property of the Owner upon completion of the work. The Agency Representative will use one or more of the acceptance methods as specified by the Agency's MSM to accept the material. Regardless of the methods utilized, the Agency Representative shall document the basis for acceptance of those materials listed in the Agency's MSM at the appropriate level.

5.2.3 Materials Acceptance Package

Prior to the preconstruction conference, the Materials Acceptance Unit (MAU) or Agency Representative will compile material acceptance requirements for the Contractor and Resident Engineer/Project Engineer of each project. The Materials Acceptance Package will be included in the project's Materials Acceptance Record. The minimum number of samples and tests required will be determined by the contract and the frequency guide schedule in the Agency's MSM.

After notice of final inspection, the Materials Acceptance Record will be evaluated by the MAU for compliance with this QAP.

For MAS projects, the Project Engineer representing the Municipality or the Agency Representative is responsible for the development of the Materials Acceptance Record and

materials acceptance requirements, as well as the evaluation of these documents for compliance with this QAP following notice of final inspection. A request can be made to have these services be provided by the MAU. For any significant discrepancy between the final project Materials Acceptance Record and the requirements of this QAP, the Agency Representative can request a written response from the Project Engineer representing the Municipality to explain the discrepancy.

5.2.4.1 Completion & Acceptance Memorandum (Level 1 and 2 Projects only)

A notice stating that the project has been completed in accordance with the contract specifications or permit conditions is required.

The Completion & Acceptance Memorandum is issued by the Regional Construction Engineer (or Local Project Manager for MAS projects). After the Completion & Acceptance Memorandum is received, the Materials Section will begin preparing the 23 CFR 637 Certificate (Materials Memo).

5.2.4.2 Completion and Acceptance Letter (Level 3 Projects only)

After completion of work and prior to final acceptance of the project, the Agency Representative shall prepare a notice affirming that the project has been completed in accordance with the contract specifications. For Title 19 V.S.A Section 1111 issued permits, the completion and acceptance letter is a completed and "signed off" permit documented by District personnel. The notice shall also state whether or not the materials incorporated into the work comply with the project requirements. Exceptions to the project or material requirements shall be noted in this document. This should be submitted to the appropriate personnel within the Agency (or to the Owner) for review and approval/acceptance.

In order to complete the Completion and Acceptance Letter, it may be necessary for the Agency Representative to provide further clarification, justification, or explanations of any material which deviated from the specifications or permit conditions, or for which the required certifications or tests were not completed. See Appendix A for examples of material explanations and justifications. For projects completed under the Title 19 V.S.A Section 1111 issued permits, the Agency may hold the Permittee responsible for such justifications. A justification may consist of an explanation on the use or incorporation of a product for which insufficient tests were performed, failing results were obtained, or there was a lack of proper certification documentation.

The following documents may be used to support the statement that the incorporated materials meet the project requirements:

- Results of Acceptance Sampling and Testing
- Materials Checklist

- Agency Representative's Clarifications, Justifications, or Explanations

5.2.5. 23 CFR 637 Certificate - Materials Memorandum

A letter shall be prepared that documents that the materials incorporated into the work comply with the project requirements. Exceptions to the project requirements shall be noted in this document.

In accordance with 23 CFR § 637.207(a)(3), the Materials Memorandum shall be submitted to the FHWA Division Administrator, or designee, for each construction project which is;

i. Subject to FHWA construction oversight activities [Projects of Divisional Interest (PoDIs)]
ii. NHS project with Federal funding

5.2.5.1 Materials Memorandum (Level 1 and 2 Projects)

The Agency will prepare a Materials Memorandum for all QAP *Level 1 and Level 2* projects that are administered by the Agency.

When the Completion & Acceptance Memorandum is received by the Materials Acceptance Unit, they will prepare a letter stating, with the exceptions noted, that the materials used on the project ***are in reasonable conformance*** with the contract. The Final Materials Memorandum will be sent to the Project File.

The following documents are used to support the statement that the incorporated materials ***are in reasonable conformance*** with the project requirements:

- Materials Record
- Materials Certification Checklist
- Results of Acceptance Sampling and Testing
- Resident's Engineer's Clarifications, Justifications, or Explanations

The Materials Memorandum will generally conform to 23 CFR § 637 Appendix A to Subpart B "Guide Letter of Certification by State Engineer", indicate if any material exceptions were incorporated into the project, and be acknowledged by the Material Manager. An example is included in Appendix B of this Quality Assurance Program document.

5.2.5.2 Materials Memorandum (Level 3 Projects)

As stated in section 5.2.4.2, for QAP Level 3 projects the Completion and Acceptance Letter will state whether or not the materials incorporated into the work comply with the project requirements, including any exceptions to the project or material requirements.

5.2.6 Prioritization of Point-of-Placement Materials Sampling (Level 1 and 2 Projects only)

Point-of-placement materials sampling refers to the act of obtaining material samples as close as practical to the final point of placement of the material. Specifically, this includes materials sampled for *acceptance* during placement of hot-mix asphalt (HMA) and Portland cement concrete (PCC), and during fabrication of precast concrete.

In the event that sampling and testing personnel cannot be dedicated to all projects, a determination shall be made to identify which projects and materials receive full sampling and testing or other appropriate methods for determining *Acceptance*. This determination shall be made by the Materials Manager or their designee for those materials produced by the HMA, PCC, and precast concrete *Producers*. Documentation of any decision to reduce, eliminate, or suspend point-of-placement material sampling should be made in writing or by email to the Resident Engineer.

5.3 Contractor Quality Control (QC)

The Agency is committed to developing a partnering relationship with its *Contractors* and material *Producers*. QC will be performed by *Contractors* and *Producers,* even if the specifications do not require formal approval of the QC Plans.

At this time, the Agency does not use *Contractor* QC test results in the *Acceptance decision*.

5.3.1 QC Plans

The Owner recommends that there be QC Plans for all materials incorporated into Owner projects. In accordance with the Agency's specifications, QC Plans are required for specific materials. Unless required by specification, *Manufacturers* may submit annual *QC plans* to the Owner for Approval, and do not need to be project-specific.

5.3.2 QC Processes

The *Producer* or *Manufacturer,* through the *Contractor,* shall provide documentation substantiating that the *QC processes* used to manufacture or produce material supplied to the Owner conform to the provisions identified in the *QC Plan*.

5.3.3 QC Personnel and Laboratories

Contractor and *Producer* QC sampling and testing personnel shall be *certified personnel. Contractor Laboratories* designated for Owner use or for QC purposes under this subsection shall meet the requirements of a *qualified laboratory.* Only QC results produced by *certified personnel* in a *qualified laboratory* will be considered in the resolution of disputes pertaining to quality of materials.

5.4 Independent Assurance (IA) Program <u>(Levels 1 and 2 only)</u>

Independent Assurance (IA) is required only for those projects being administered under direct VTrans supervision. IA activities can be provided as a service to municipalities pending a written agreement of scope of work.

The Vermont Agency of Transportation conducts an *IA Program* in accordance with 23 CFR Part 637.207 to provide an unbiased and independent evaluation of the *Acceptance Program.* IA is used to independently assess the process, not the product. The results of IA sampling, testing, or inspection are used to affirm the integrity of the acceptance program. However, if IA testing or inspections indicate a potential problem with the quality of the material or workmanship, then the findings may be used to initiate additional sampling, testing, or inspections.

The IA Program shall be administered by *qualified technicians* assigned to, or contracted by, the Agency's IA Unit. IA laboratory testing shall be performed in an *Accredited Laboratory* except when the testing procedure requires that a step must be performed within a certain timeframe or temperature after sampling. In this case, the necessary step(s) will be performed at a *qualified lab* or directly in the field.

The IA Program uses a *system-based approach*, as described below, to evaluate the *Acceptance Program*. Sampling and testing personnel, procedures, and *qualified* laboratories from which results are used in the acceptance decision are evaluated by the IA Program for compliance with applicable procedures and standards.

5.4.1 Evaluation of Sampling and Testing Personnel

The IA Program is responsible for evaluating the procedures used by sampling and testing personnel. The evaluation of sampling and testing personnel will be determined by using a combination of field observations and *split*, or *replicate*, *samples*. For all materials, other than composite, wet delivered structural concrete, it is the Agency's goal that *proficiency evaluation*s will be conducted that account for 90% of the sampling and test procedures performed by qualified technicians for *acceptance* each calendar year.

For composite, wet delivered structural concrete it is the IA program's goal to evaluate 75% of the total number of field personnel who sample concrete more than 2 days per calendar year. For composite, wet delivered structural concrete, proficiency evaluations will be conducted for each sampling and test procedure performed that is used in the *Acceptance* decision.

5.4.1.1 Field Observations

IA technicians will observe personnel performing *acceptance sampling and testing* for conformance to specified sampling and testing procedures and protocols to evaluate personnel proficiency. Inconsistencies will be documented in a Technician Proficiency Report. Failure to comply with sampling and testing procedures will be reported to the Materials Manager for determination of appropriate action by the IA supervisor.

For technicians continuing to perform acceptance sampling and testing, the IA technicians will perform a follow-up inspection as soon as practical for both parties to verify that the acceptance technician has corrected identified deficiencies. Should any of the same deficiencies be noted during the follow-up inspection, they will be noted in the technician's follow–up Proficiency Report. The Materials Manager will determine whether or not corrective action is warranted. This qualified technician should not be permitted to continue sampling and testing until all issues are resolved.

5.4.1.2 Independent Assurance Comparisons

The IA comparison process compares the material test results of the Acceptance and IA technicians to identify possible equipment or procedural anomalies. The samples used in the IA comparison process are typically obtained by Acceptance and IA personnel. *IA comparisons samples* should be taken as split samples whenever possible to help remove inherent sampling variability. In cases where this is not possible or is impractical, replicate samples may be taken. The samples are designated as an "Acceptance Sample" and an "IA Sample" and are associated to each other by a link to number.

Upon sampling, a chain of custody is maintained for each sample to reduce the possibility of contamination and to maintain the integrity of the sample until testing is completed. The test results of the Acceptance and IA samples are compared to determine if the difference between the test results are within the tolerable limits designated in the test method. IA Comparison Reports are generated and distributed by the IA supervisor within 10 working days upon receipt of the acceptance test results.

IA comparison results that are outside the tolerable limits are addressed by investigating the equipment used during Acceptance and IA testing. If an apparent discrepancy cannot be found in either the IA or the Acceptance equipment then the Acceptance technician's proficiency is evaluated by observation. If no deficiencies are observed during the testing procedure and past results indicate that comparisons have been consistently within the tolerable limits, the discrepancy may be treated as an anomaly. However, if future comparisons indicate a trend, then a thorough investigation of the *acceptance sampling and testing* process will be conducted that may include, but not be limited to, additional sampling and testing, observation of procedures and calibration checks of equipment by the IA Unit.

5.4.2 IA Comparison Reports and Technician Proficiency Reports

IA Comparison Reports and Technician Proficiency Reports are completed, and then distributed under the authority of the Materials Manager to the Acceptance Technician, Independent Assurance (IA) Supervisor, and the Acceptance Technician's Supervisor within 15 working days upon receipt of the acceptance test results.

5.4.3 Independent Assurance Laboratory Assessments

Laboratories that have met the requirements of the Agency's *Qualified Laboratory Program (QLP)* may be assessed a minimum of once per year as determined by the Independent Assurance (IA) Supervisor. Inspections will be conducted at random intervals throughout the construction season. *Accredited laboratories* are exempt from evaluation by the Agency's IA program.

The IA technician will review a list of equipment to verify that all testing equipment is present and complies with all applicable equipment calibration requirements. The IA Supervisor may direct the IA technicians to perform mandatory equipment checks for those pieces of equipment that in the past have demonstrated a higher risk to the Owner. Additionally, equipment calibration records shall be verified selectively on a minimum of five pieces of equipment during each assessment to confirm the laboratory equipment calibration records. Mandatory equipment checks are not included in the required number of selective equipment calibration checks.

5.4.4 Annual Report to FHWA

The Materials Manager will submit an annual report summarizing the results of the IA program's assessment of the Owner's Acceptance Program. The report will include:

1. The number of active technicians, the number of technicians evaluated, how often each technician was evaluated, and a summary of the results of the evaluations including what test procedures were evaluated by IA comparisons and by observation.

2. The report will detail the test results of split samples, noting any deficiencies, an analysis of any problems encountered, and how they were resolved.

3. The summary of annual assessments of laboratories including names and locations of the Agency Laboratories, Consultant Laboratories, and Contractor Laboratories inspected. The date of each laboratory inspection will be included along with a summary of the results of the inspections including what equipment was inspected. The report will also identify the material(s) tested at each laboratory. The resolutions of any problems identified will also be reported.

4. A summary of any identifiable trends including any recommendations for overall systematic improvements to the Quality Assurance Program.

5.5 Laboratory Qualifications

The Agency's *Central Laboratory* located in Berlin, VT is an AASHTO Re:source *accredited laboratory* and is not evaluated under the Agency's *Qualified Laboratory Program*.

All other laboratories where acceptance sampling and testing is performed, including Agency, Consultant, Producer, or Contractor laboratories, are required to be *qualified* in accordance with the Agency's *Qualified Laboratory Program*.

6.0 LEVEL 4 PROJECTS

6.1 Introduction

The intent of the following guidance for Level 4 is to assure that an adequate level of quality is achieved for those significant bridge and roadway materials that are used by the Agency's District Maintenance and Fleet Division (DMFD). The use of these materials may be during routine

maintenance activities or during the construction of special projects. Bridge activities may include, but are not limited to, deck rehabilitation, deck membrane replacement and rehabilitation, joint replacement, bridge railing repairs, or deck repairs. Roadway activities may include, but are not limited to, leveling or resurfacing, mainline paving projects (i.e., for long-term "temporary" bridges), construction of turning lanes or widening of existing highways, or guardrail replacement projects.

Personnel from the Agency's District Maintenance and Fleet Division (DMFD) are responsible for ensuring that materials detailed in the Agency's MSM – Level 4 meet the material requirements detailed in the current edition of the Agency's Standard Specifications for Construction or current Agency purchasing contracts.

Although the actual field or laboratory testing may be performed by the *Contractor*, *Producer*, or *Contractor's* Representative, the acceptance of the materials is still the responsibility of the District Maintenance and Fleet Division (DMFD) District Representative. The District Representative is the Agency Representative for this Level.

It is recognized that this document may be used by others with overlapping assignments in the administration of the project; therefore, it is recommended that an independent or supervisory review and approval of materials acceptance activities be performed by the District Transportation Administrator.

6.2 Acceptance Program

6.2.1 Acceptance Sampling and Testing

The Owner may elect to sample and test materials normally accepted based on *Contractor* test results. In addition, the Agency's Representative may elect to sample and test at a higher frequency than the sampling frequency detailed in the Agency's MSM – Level 4.

Acceptance sampling and testing, regardless of who performs the tests, should be conducted in accordance with the sampling and testing procedures detailed in the Agency's MSM – Level 4.

Only *qualified personnel* should conduct *acceptance sampling and testing.* Qualified technicians should satisfy the requirements for Qualified Technician as defined in the Agency's Qualified Technician Program.

6.2.2 Determination of Acceptance

The designated Agency Representative is responsible for *Acceptance* of the materials and work accomplished on or within the Owner's right-of-way, or of any work that will become the

property of the Owner upon completion of the work. The Agency Representative will use one or more of the acceptance methods as specified by the Agency's Materials Sampling Manual to accept the material. Regardless of the methods utilized, the Agency Representative shall document the basis for acceptance of those materials listed in the Agency's MSM Frequency Guide Schedules for Level 4 projects.

The Owner's purchasing contracts should specify acceptance requirements for materials not covered by the Agency's MSM.

Whenever possible Agency Representatives will use materials included on the current edition of the Agency's Approved Products List (APL). For those projects where an approved product is not readily available the Agency Representative shall contact the party that administers the APL to discuss acquiring written conditional approval.

6.2.3 Materials Certification

Materials may require certification to assure that the Agency or Contractor is incorporating quality materials into the project.

6.3 Contractor Quality Control

Quality Control will be performed by *Contractors* and *Producers,* even if the specifications do not require formal approval of the *Quality Control Plans.*

6.3.1 Quality Control Personnel and Laboratories

Contractor and *Producer* QC sampling and testing personnel shall be *certified personnel. Contractor Laboratories* designated for Owner use or for QC purposes under this subsection shall meet the requirements of a *qualified laboratory.*

6.3.2 Quality Control Sampling and Testing used in the Acceptance Decision

Refer to Agency's MSM Frequency Guide Schedules for Level 4 projects.

6.4 Laboratory Qualifications

The Agency's *Central Laboratory* located in Berlin, VT is an AASHTO Re:source *accredited laboratory* and is not evaluated under the Agency's Qualified Laboratory Program.

All other laboratories where acceptance sampling and testing is performed, including Agency,

Consultant, Producer, or Contractor laboratories, are required to be qualified in accordance with the Agency's Qualified Laboratory Program.

7.0 Clarification and Resolution of Material Test Results - Levels 1, 2, and 3

7.1 Introduction

The principles outlined in this section are intended to complement the executed contract or approved permit. If a conflict arises, the requirements specific to the contract govern. The underlying principles include: an accurate description of a deviation from specified materials, a fair assessment of the value of the final product or material and a clear process to promote prompt resolution. The concept of "value" includes several considerations not merely an assessment of production costs. Among them are initial cost, item serviceability, item durability and indirect costs to the public that occur during construction, future maintenance costs (to include the type of maintenance and frequency), or unplanned remediation. The owner of the facility reserves the right to define the individual weighting of these factors based on the facility and specific areas of difference.

Following the *Acceptance Decision,* the *Contractor* may request that the appropriate Agency Bureau Director mediate the dispute. If no agreement on the validity of the combined information (i.e. Owner and *Contractor* supplied) is reached, a *referee sample* may be sent to an independent laboratory for testing.

If the *Contractor* is aggrieved by the decision of the Director, the *Contractor* may appeal the decision as allowed for in their contract with the Agency.

7.2 Roles and Responsibilities

It is the responsibility of all participants involved with Owner contracts or permits to clarify differences of data, fact, interpretation or opinion relating to materials incorporated into Owner projects so that complete and accurate results will be available for discussion.

7.2.1 Contractor

If the *Contractor* decides to contest the Owner test results, the *Contractor* will be expected to submit any and all relevant test results including those developed by their *Subcontractors* or Producers, to the Owner with notification of the difference of opinion. The *Contractor's* submittal must include an explanation of the accuracy of the information, effects on cost, serviceability and durability to the Owner for consideration. The *Contractor* is expected to

effectively communicate the areas of difference, while providing supporting documentation and conclusions about the existing value provided by the disputed product.

7.2.2 Owner

The Owner will provide results of all *acceptance sampling and testing* activities to the *Contractor* in a timely manner. The Owner testing protocols and results will conform to the current test methods as identified in the Owner specifications, unless otherwise noted. The Owner will not examine any *Contractor* opinion unless there are corroborating test results. Test results and other *Contractor* supplied information will be analyzed with the purpose of establishing the most accurate and objective determination of material quality of the disputed material.

7.2.3 Independent (Third Party)

Referee samples will be tested by an independent third-party laboratory selected by the Owner. The Owner will notify the *Contractor* of the selection of the third-party laboratory. The independent third-party laboratory will perform tests in accordance with standard test methods defined by the Owner. The independent laboratory must be an AASHTO *accredited laboratory* for each material test being conducted. The test results and remaining material sample(s) shall be retained by the independent laboratory until the Owner authorizes sample destruction and release of test reports.

7.3 Process

The following procedures shall apply for clarifying the differences in material test results, workmanship or inspection findings, and quality of materials accepted without project specific testing or certification.

The establishment of the *Acceptance decision* and optional description of findings will be performed by the Owner. In case of any dispute arising between the *Contractor* and the Owner regarding the materials furnished or the manner of performing the work, the Agency Representative has the authority to reject the materials and/or to suspend the work until the dispute is decided by the appropriate Agency Bureau Director.

For Agency projects, the *Contractor* must comply with the contract provisions as stated in Section 105.01 and 105.02 of the current edition of the Agency's Standard Specifications for Construction. For Municipal projects the *Contractor* must comply with the contract plans and specifications. For entities conducting work under an Agency issued Title 19 V.S.A 1111 permit the *Contractor* must comply with the specified permit conditions.

The *Contractor*, after reviewing the Owner's *Acceptance* decision, may determine that a difference in underlying facts warrants clarification under these principles. The *Contractor* must show cause for the difference derived from material test or inspection records associated with the project, production facility, or manufacturing plant. *Quality control plan*, testing practices and test results may be used to further define the *Contractor's* perception relative to the difference in quality materials or workmanship.

The Owner will provide a decision regarding the differences.

APPENDIX A

Examples of Material Explanations / Justifications

VERMONT

Material Samples

Pay Item No.	Justification for Retention / Disposition
203.31, Sand Borrow	1% high passing the 200 sieve, quantity was 1,000 cy of 29,000 cy. This was considered a minor failure and accepted.
204.30, Granular Backfill for Structures	3% high passing the 100 sieve, quantity was 130 cy of 130 cy on the project. This material was paid at a reduced price, see Change Order #1.
406.25, Bituminous Concrete Pavement D000652 (failure) Compaction Asphalt Cement 54 samples required – 53 taken	3% high passing the ½" sieve, quantity was 500 tons out of 40,000 tons. Adjusted and retested. Retest #D000653 met specifications, therefore the material was accepted as a minor deviation. The average of the cores was 89.2% which is 0.8% below the acceptable range. The quantity was 578 tons out of 40,000 tons total. A 20% reduction in price was taken on that day's production. Original quantity was 40,000 tons and the final quantity was 39,553 tons; therefore less samples were required.
541.25, Concrete Class B Portland Cement 1 sample required – 0 taken	Original quantity was 6 cy; final quantity was 5.3 cy. Resident Engineer called Rick Hale, Structural Concrete Engineer, at 10 a.m. on June 3, 2000, to request a plant inspector for a 2 p.m. concrete placement on June 4, 1999. Rick said he did not have an inspector available. This was the only concrete placement on this project. Results of air and slump tests as well as cylinder breaks were all within specifications.

Certifications

Pay Item No.	Justification For Use Without Certification
616.35, Treated Timber Curb	This item was not used.

VERMONT

649.51, Geotextile for Silt fence	Under the provisions of Small Quantity Certification Waiver detailed in the MSM, the certification of this item is waived. The cost of this item was less than $5,000 and its use did not directly involve the safety of the roadway.

APPENDIX B

Example Materials Memo

VERMONT

TO: Materials Project File

FROM: Philip Peloquin, Quality Assurance Manager

DATE: 3/24/2021

SUBJECT: Example Project – Materials Memorandum

In accordance with 23 CFR § 637.207(a)(3), this is to certify that:

The results of the tests and certifications 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, with the exception(s) as explained and/or accepted by the individual responsible for the acceptance descision on the attached sheet(s).

_____

Nicholas Van Den Berg, P.E.
Material Testing & Certifications Manager

VERMONT

Attch:
Material Exception Summary

cc:
DocExpress, Project Field Drawer
Matthew DiGiovanni, FHWA Construction & Materials Engineer
Larkin Wellborn, FHWA Construction & Materials Engineer
FHWA on cc'd on projects with Federal Oversight

VERMONT

DocuSign

Certificate Of Completion

Envelope Id: 38BD42B8EB5F4AA8990B0C46F06141FB
Subject: Please DocuSign: 2022 VTrans QAP - 07072022 edits.pdf
Source Envelope:
Document Pages: 35
Certificate Pages: 5
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC-05:00) Eastern Time (US & Canada)

Signatures: 2
Initials: 0

Status: Completed

Envelope Originator:
Nick VanDenBerg
One National Life Drive - Dewey Building
Montpelier, VT 05620-2001
Nick.VanDenBerg@vermont.gov
IP Address: 24.147.121.253

Record Tracking

Status: Original
7/7/2022 11:29:15 AM
Security Appliance Status: Connected
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Holder: Nick VanDenBerg
Nick.VanDenBerg@vermont.gov
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Signer Events	Signature	Timestamp
Larkin Wellborn Larkin.Wellborn@dot.gov Security Level: Email, Account Authentication (None)	DocuSigned by: Larkin Wellborn 01878289816F4E4... Signature Adoption: Pre-selected Style Using IP Address: 169.135.56.101	Sent: 7/7/2022 11:30:06 AM Viewed: 7/7/2022 11:40:32 AM Signed: 7/7/2022 11:40:59 AM

Electronic Record and Signature Disclosure:
Accepted: 7/7/2022 11:40:32 AM
ID: 3ee31021-2691-4eac-ba14-c206ed1a8d84

Nick VanDenBerg nick.vandenberg@vermont.gov SOV Security Level: Email, Account Authentication (None)	DocuSigned by: Nick VanDenBerg 57D4DD3560C24C2... Signature Adoption: Pre-selected Style Using IP Address: 24.147.121.253	Sent: 7/7/2022 11:30:05 AM Viewed: 7/7/2022 11:30:22 AM Signed: 7/7/2022 11:31:08 AM

Electronic Record and Signature Disclosure:
Not Offered via DocuSign

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

Agent Delivery Events	Status	Timestamp

Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	7/7/2022 11:30:06 AM

Envelope Summary Events	Status	Timestamps
Certified Delivered	Security Checked	7/7/2022 11:30:22 AM
Signing Complete	Security Checked	7/7/2022 11:31:08 AM
Completed	Security Checked	7/7/2022 11:40:59 AM

Payment Events	Status	Timestamps

Electronic Record and Signature Disclosure

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