



VIRGINIA DEPARTMENT OF TRANSPORTATION

Minimum Requirements for Quality Assurance & Quality Control on Design Build & Public-Private Transportation Act Projects

August 2008

(Revised July 2008)

Contents Amendment Record

This report has been issued and amended as follows:

| Issue | Rev | Description | Date | Signed |
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| 1 | 0 | Original Issue | August 20, 2007 | RTP |
| 1 | 1 | Provides a translation of the percentage base testing frequencies (QA/QC/IA and IV) into tangible quantifiable frequencies and work descriptions and effects the following tables: <ul style="list-style-type: none">• Table 105.4, and• Table 105.5. | July 28, 2008 | RTP |

TABLE OF CONTENTS

| | |
|---|-----------|
| 101 DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS | 3 |
| 101.01 Abbreviations and Acronyms | 3 |
| 101.02 Terms | 4 |
| 102 DESCRIPTION OF QA/QC PLAN REQUIREMENTS | 5 |
| 103 DESIGN-BUILDER QA/QC STAFF ROLES AND RESPONSIBILITIES | 7 |
| 103.01 Design-Builder Quality Assurance Manager (QAM) | 7 |
| 103.02 Design-Builder Design Manager | 7 |
| 103.02 Design-Builder Construction Manager | 8 |
| 103.03 Testing Technicians | 8 |
| 103.04 Inspection Technicians | 9 |
| 104 DESIGN QA/QC PLAN REQUIREMENTS | 10 |
| 104.01 General | 10 |
| 104.02 Design Quality Review | 11 |
| 104.03 Department Approvals and Review of Design Work | 11 |
| 104.04 Quality Assurance & Quality Control of Design and Field Changes | 12 |
| 105 CONSTRUCTION QA/QC PLAN REQUIREMENTS | 15 |
| 105.01 General | 15 |
| 105.02 Department Responsibilities | 16 |
| 105.03 Design-Builder Responsibilities | 16 |
| 105.04 Preparatory Inspection Meetings | 18 |
| 105.05 Design-Builder Sampling and Testing | 18 |
| 105.06 Design-Builder Laboratories | 19 |
| 105.07 Records | 19 |
| 105.08 Independent Assurance Inspection | 19 |
| 105.09 Acceptance | 19 |
| 105.09.01 Plant Manufactured Materials Acceptance | 19 |
| 105.09.01.01 | 20 |
| 105.09.02 Rejected Materials | 22 |
| 105.09.03 Non-Statistical Acceptance of Small Quantities of Materials | 23 |
| 105.10 Witness and Hold Points | 23 |
| 105.09.01 Witness and Hold Point Coordination | 23 |
| 105.09.02 Hold Points – Minimum Requirements | 24 |
| 105.09.03 Witness Points – Minimum Requirements | 24 |
| 105.11 Performance Verification of Project Geotechnical Elements/Features | 24 |

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

| | |
|--|-----------|
| 105.12 Department Inspected and Tested Items | 25 |
| 105.13 Inspection Documentation | 25 |
| 105.13.01 Inspection Documentation and Reporting Process | 26 |
| 105.13.02 Department Inspection Validation and Administration Process | 26 |
| 105.13.03 Preparatory Inspections | 26 |
| 105.13.04 Intermediate Inspections | 27 |
| 105.13.05 Completion Inspections | 27 |
| 105.13.06 Punchout Inspections | 27 |
| 105.14 Construction Inspection Checklists | 28 |
| 105.15 Project Communications | 30 |

SECTION 101 - DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS

101.01-Abbreviations and Acronyms

Abbreviations and Acronyms shall be as stated in Section 101.01 of the Standard Specifications. Additional or key abbreviations relative to the Department's Requirements for Contractor QA/QC Plans on Design-Build Projects are as follows:

D-B Design-Builder. Any individual, partnership, corporation, or joint venture that contracts with the Department to perform the Contract.

IA Independent Assurance. Inspection performed by the Department (or agent) to independently evaluate all sampling, equipment and testing procedures used in the acceptance program. This may include split samples, calibration checks and/or observations.

IV Independent Verification. Inspection performed by the Department (or agent) that serves as an oversight role for the Design-Builder's QA/QC Team. Owner Independent Verification is performed to satisfy VDOT and FHWA's requirements for documenting that proper QA/QC is being performed on the Project and to provide adequate assurance that the public is receiving the desired quality in the project undergoing construction.

OIA Owner Independent Assessment. Oversight performed by the Department (or agent) to satisfy VDOT and FHWA's requirements for documenting that proper QC and QA is being performed. This oversight provides an independent assessment of Design-Builder's implementation of and compliance with the approved Quality Control and Quality Assurance plan

OIV Owner Independent Validation. Oversight performed by the Department (or agent). The focus of owner independent validation is to verify Design-Builder's QC and QA compliance and confirm that the quality characteristics of the products incorporated in the project are valid for acceptance and payment in accordance with Section 6.2.1.2, Part 4.

QA Quality Assurance – A process performed independently of the construction contractor (contractor's production forces) for the purpose of determining the conformance of the work by examining the QC data and/or providing objective evidence ([independent sampling and testing](#)), to verify the contractor's quality control sampling and testing. The contractor will ([organizationally through services independent of production forces](#)) provide the QA inspection normally provided by VDOT or its consultant on a traditional Design-Bid-Build project.

QA/QC Plan is a plan that details how the Design-Builder will provide quality control (QC) and quality assurance (QA) for both the design and construction elements of the project, obtain samples for Design-Builder quality control testing, perform tests for Design-Builder quality control, provide inspection, and exercise management control (e.g. quality assurance testing) to ensure the work conforms to the contract requirements.

QAM Quality Assurance Manager (*QA Manager*) is the Design-Builder's designee responsible for providing Quality Assurance and Quality Control of the Work, and ensuring conformance with the Contract Documents is the individual with overall responsibility for the development of and adherence to the Design-Build QA/QC Plan. The QAM is responsible for supervising the performance of all field materials tests performed by the Design-Builder including but not limited to, density, moisture, air content of concrete, slump, and other required materials field tests.

QC Quality Control - Quality control functions performed by the Design-Builder. The quality control function (QC) is to assess and adjust design, production and construction processes so as to control the level of quality being produced in the Project. The purpose of QC is to measure those quality characteristics and to inspect those activities that affect the production at a time when corrective action can be taken to substantially decrease the likelihood that appreciable non-conforming material will be incorporated in the Project.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

101.02-Terms

In these Specifications the following key terms shall be interpreted as defined below. Definitions for other terms may be found in the Agreement or General Conditions of the Contract or in Section 101.02 of the Standard Specifications.

Hold Point Mandatory verification points identified within the QA/QC Plan and CPM schedule beyond which work cannot proceed until mandatory verification is performed and a written release is granted by the Department.

Inspection Technician has the meaning as set forth in Section 103.04 of this document.

Testing Technician has the meaning as set forth in Section 103.03 of this document.

Witness Point Points where critical characteristics are to be measured and maintained, and/or at points where it is nearly impossible to determine the adequacy of either materials or workmanship once work proceeds past this point. Advance notification is to be given to the Department so that it may observe the status of the work at witness points. Work may proceed beyond a witness point with or without participation by VDOT provided proper notification has been given.

SECTION 102 - DESCRIPTION OF QA/QC PLAN REQUIREMENTS

These requirements are intended to assist the Design-Builder in the preparation of an acceptable Quality Assurance (QA) Plan and an acceptable Quality Control (QC) Plan. The QA Plan shall be separate and distinct from the QC Plan. Both the QA Plan and the QC Plan are subsets of the overall QA/QC Plan. The submission of the QA/QC Plan shall be part of the Design-Builder's Final Proposal and must be approved by the Department in writing prior to the start of any work activities. The Department may partially approve the QA/QC Plan in its sole discretion. This approval will occur after the selection process in order to allow for minor modifications to the Plan if necessary.

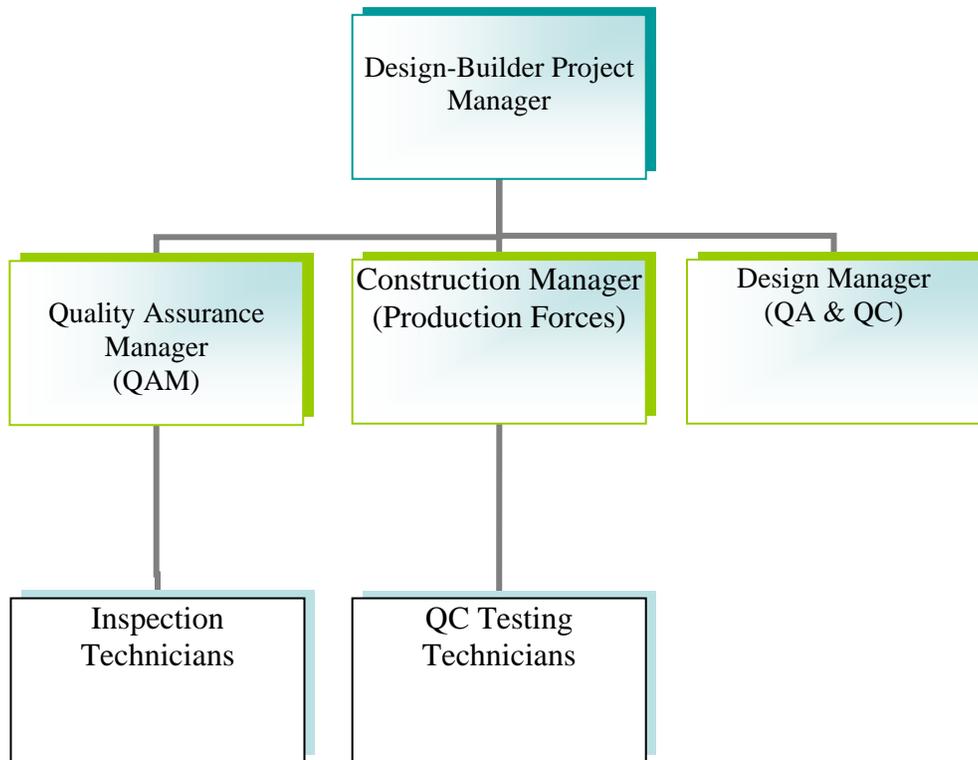
The QA/QC Plan shall detail how the Design-Builder (D-B) will provide quality assurance and quality control for both the design and construction elements of the project, including but not limited to sampling, testing, inspection, management control, change management, document control, communication requirements, and non-compliant work corrective action plans to ensure that the work conforms to the contract requirements. The Plan shall also detail the D-B's QA/QC program for both the design and construction elements to be completed by a subcontractor, supplier, vendor, agent, or other entity with contractual obligations to complete design or construction elements of the project.

The Plan shall detail the Design-Builder's QC and QA organizations, including the expected minimum number of full-time equivalent employees with specific quality assurance or quality control responsibilities with an organizational chart showing lines of authority and reporting responsibilities. The QA/QC Plan shall define the relationship between the QA and QC organizations and the design and construction organizations to ensure that the decisions made by the QA and QC personnel are not based upon the impact such decisions may have on the project's schedule, contractor's performance or project profitability.

To further ensure organizational independence, the QA organization shall be distinct and separate from the design and production staff. All key personnel performing QA or QC functions shall be exclusively designated to such and shall not be assigned to perform conflicting duties or production work. The Department, at its sole discretion, may approve a QA organization that is not a separate entity from the design and production organizations should the Design-Builder demonstrate to the Department how QA and QC functions will be performed independently to maintain the integrity of the process.

A sample organizational chart for simple D-B projects which illustrates the independence of the QA organization is shown in Figure 102-1:

**FIGURE 102-1
ORGANIZATIONAL CHART
SIMPLE DESIGN-BUILD PROJECTS**



SECTION 103 DESIGN-BUILDER QA/QC STAFF ROLES AND RESPONSIBILITIES

As part of the submission process, full detailed resumes with references shall be submitted to the Department identifying the Design-Builder’s QA/QC staff for all personnel that will be employed in a supervisory or management position. The persons or organizations performing Quality Assurance and/or Quality Control shall have sufficient authority and organizational autonomy to identify quality problems, and to initiate, recommend, and verify implementation of solutions. The Quality Assurance Manager shall have full authority to shut down the project and/ or be able to withhold payment for items that are not acceptable. This authority must be in writing from the Design-Builder to the Quality Assurance Manager. At a minimum the Design-Builder QA/QC staff shall include the following as shown in Table 103-1:

| Table 103-1 | | | |
|---|---|--|---|
| Position | Responsibility | Reports To | Qualifications |
| QAM | Overall responsibility for the development of and adherence to the Design-Build QA/QC Plan. | Design-Builder at the executive level – does not report to production forces | Virginia PE and ten years supervisory experience in roadway or bridge design or ten years supervisory experience in inspection or materials testing |
| QA Testing Technicians & Inspection Technicians | Responsible for QA testing of items of work for conformance with plans and specifications. | QAM | VDOT certified |
| QC Testing Technicians | Responsible for QC testing of items of work for conformance with plans and specifications. | Contractor’s Production Forces | VDOT certified |

103.01 Design-Builder Quality Assurance Manager (QAM)

The Design-Builder Quality Assurance Manager is the individual with overall responsibility for the development of and adherence to the Design-Build QA/QC Plan. Unless otherwise stated in the RFP, this individual shall meet the following qualifications:

- Be a Professional Engineer licensed by the State of Virginia.
- Have a minimum of ten years supervisory experience in roadway or bridge design or ten years supervisory experience in inspection or materials testing on highway transportation construction projects or a combination thereof.

103.02 Design-Builder Design Manager

The Design-Builder Design Manager is the individual with overall responsibility for the design portion of the Design-Build QA/QC Plan. Unless otherwise stated in the RFP, this individual shall be a Professional Engineer licensed by the State of Virginia and have a minimum of five years supervisory experience in either roadway or bridge design on highway transportation construction projects. This person may be the same as the Quality Assurance Manager, if approved by the Department.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

The Design Manager shall be responsible for overall management of the QA/QC programs for design. This individual, shall report directly to the Design-Builder's Project Manager, and is responsible for all of the design QA activities.

Design-Builder Construction Manager

The Design-Builder Construction Manager shall have responsibility for the construction portion of the Design-Build QA/QC Plan. This individual shall be responsible for implementing, monitoring and, as necessary, adjusting the processes to assure acceptable quality of the construction work. This individual shall have a minimum of five years supervisory experience in inspection or documentation or materials testing or combination thereof on highway transportation construction projects, and other requirements as specified in the RFP. If approved by the Department, this position may be the same person as the QA Manager.

103.03 Testing Technicians

Testing Technicians are staff employed by the Design-Builder who perform on-site materials testing including, but not limited to, density, moisture, air content of concrete, slump, and other required materials field tests. QA Testing Technicians shall report directly to the QAM and may not be employed as Design-Builder's production forces. QC Testing Technicians may fulfill the requirements for materials testing for Quality Control and may be employed by the Design-Builder's production forces. The QA and QC Testing Technicians shall hold current VDOT materials testing certifications for the types of materials testing that they are assigned to perform. Prior to the start of each work activity, the QAM shall identify the QA Testing Technician(s) by name and provide a detailed qualification matrix for each type of testing required illustrating each technician's qualifications and respective test(s) that is (are) to be performed. The Design-Builder shall coordinate with the QAM and identify the QC Testing Technician(s) prior to the start of each work activity and provide a detailed qualification matrix for each type of testing required. These qualification matrices shall be submitted to the Department's Project Manager for review and approval prior to the start of each work activity.

Material testing certifications include, but are not limited to, the following:

- Asphalt Concrete, Field
- Hydraulic Cement Concrete, Field
- Soils and Aggregate
- Nuclear Safety, and
- Others, as identified in the Contract

The qualifications of laboratory technicians employed by a laboratory accredited by the AASHTO Accreditation Program (AAP) may be accepted for AASHTO test methods when confirmed by the laboratory's training and evaluation records and for such test not covered by VDOT's certification program.

The testing technicians performing the field and laboratory sampling and testing shall be employed when necessary by the Design-Builder or agents laboratory and supervised by the Quality Assurance Manager.

103.04 Inspection Technicians

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

The Design-Builder's QA Inspection Technicians shall have a minimum of three years roadway and/or bridge construction inspection experience in the work activity being inspected. Prior to the start of each work activity, the QA Manager shall identify each inspection technician(s) by name and provide a detailed qualification matrix for each type of inspection required.

Inspection Technicians shall have the certifications, VDOT and others, applicable to the work to be performed. Such certifications may include:

- Asphalt Concrete, Field
- Hydraulic Cement Concrete, Field
- Soils and Aggregate
- Surface Treatment
- Slurry Treatment
- Guardrail Installation
- Pavement Marking
- Nuclear Safety
- OSHA 10-Hour
- E&S Inspector (as administered by the Department of Conservation and Recreation)
- Work Area Protection, and
- Others as required by the nature of the Work and/or as identified in the Contract

The inspection technicians shall be employed when necessary by the Design-Builder or agents laboratory and supervised by the Construction Manager. The inspection technicians may only perform materials testing on items for which they are certified.

SECTION 104 - DESIGN QA/QC PLAN REQUIREMENTS

104.01 General

The Quality Assurance and Quality Control procedures shall be organized by each type of engineering discipline (such as structural, civil and utilities). These procedures shall specify measures to be taken by the Design-Builder (1) to ensure that appropriate quality standards are specified and included in the drawings, specifications, and other design submittals and to control deviations from such standards, it being understood and agreed that no deviations from such standards shall be made unless they have been previously approved by the Department at the Department's sole discretion, and (2) for the selection of suitability of materials, and elements of the Work that are included in the Project.

In general, design QC shall include review of math and engineering computations; technical accuracy; conformance to Contract requirements; review of form, content and spelling, and coordination with other design disciplines and sequence of construction. Design QA shall evaluate whether the designer assessed the problem appropriately, applied the correct analyses, and assigned qualified personnel to the tasks. QA also shall address whether the solution is practical and cost effective, and whether the design is within an appropriate range based on experience and "back of the envelope" estimates. The QA/QC Plan shall specifically include constructability reviews.

In addition, the Design QA/QC Plan shall include the following:

All quality assurance and quality control procedures proposed by the Design-Builder for the design process shall be included in the QA/QC plan. Procedures shall be included for preparing and checking all drawings, specifications, and other design submittals to the Department to ensure that they are independently checked and by experienced professionals prior to submission.

Drawings, specifications, and other design submittals shall be stamped, signed and dated by the responsible Virginia licensed architect or engineer where required under the Contract provisions or by applicable laws. It is anticipated that a substantial portion of the Design QA/QC Plan shall rely upon the Design Consultant's use of licensed professionals who are governed by statutory requirements and standards of care.

The Design QA/QC plan shall set forth the level, frequency and methods of review for the adequacy of the design of the Project including the methods for independent review of the final drawings, specifications, and other design submittals to ensure compliance with Department's functional requirements for the Project as outlined in the Contract.

The Design QA/QC plan shall set forth the procedures for coordinating work performed by different persons in the same or adjacent area, work element or project feature, or in related tasks to ensure that conflicts, omissions or misalignments do not occur between drawings or between the drawings and the specifications and to coordinate the review, approval, release, distribution and revision of documents involving such persons. The Design QA/QC plan shall also set forth the procedures for ensuring QA and QC requirements are met for adequate right of way and avoidance of utility conflicts.

The Design QA/QC plan shall identify those elements of the Contract, drawings, specifications, and other design submittals, if any, requiring special construction Quality Assurance and/or Quality Control attention or emphasis, including applicable standards of quality or practice to be met, level of completeness and/or extent of detailing required, or Special Provisions to the Road and Bridge Specifications.

The Design QA/QC plan shall identify by firm, discipline, name, qualifications, duties, responsibilities and authorities for all persons and entities proposed to be responsible for design QA and QC activities, including subconsultants.

Design quality assurance and quality control functions, including scheduled activities for design QA and QC identifying the drawings, specifications, and other design submittals to be delivered to the Department for its review at each stage of the design or work phase of the Project shall be described in the Design QA/QC

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

plan. These submittals and the review process shall be in accordance with “Part 4 General Conditions of Contract Between Department and Design-Builder”.

104.02 Design Quality Review

Prior to the release of the final drawings, specifications, and other design submittals, the Design-Builder shall complete review of architects and engineers experienced in the appropriate disciplines(s). The review shall verify that the drawings, specifications, and other design submittals were prepared in such a manner as to ensure that they will be acceptable to the Department. The Design Manager shall maintain close communication with Design-Builder’s Project Manager and shall ensure the Project is completed in accordance with the requirements of the Contract Documents. The Design Manager shall review and approve all submittals prior to submission to the Department.

The criteria used in such review shall include (1) conformity of the final drawings, specifications, and other design submittals with the Contract; (2) assurance that all materials, equipment and elements of the Work provided for in such documents which shall be incorporated into the Project have been provided for and designed to perform satisfactorily for the purpose intended; (3) the technical and grammatical accuracy, appearance, and organization of such documents; (4) verification that such documents have been checked and signed by the drafter, designer, and reviewers; (5) where required under the Contract, generally accepted architectural or engineering practices or applicable law, verification that such documents have been stamped, signed and dated by the responsible Virginia registered civil engineer or architect; and (6) assurance that such documents fully provide for constructability, compatibility of materials and conformity to acceptance criteria for inspections and tests as provided in the Contract.

Design-Builder’s Design Quality Control Plan shall address interim design submissions, related to Preliminary Field Inspection (“PFI”); Field Inspection and Right of Way (“FI/RW”); additional interim design submissions; and Construction Documents that Department may require; design review meetings/schedule; publishing and distribution of design review meeting notes and design submission status; and other Design Development Services requirements as set forth in Section 2. 4, Part 4-General Conditions of Contract.

The QA/QC Plan shall clearly demonstrate that all design related documents (reports, design calculations, plans, specifications, special provisions and estimates) are technically reviewed by competent, independent reviewers, including procedures to correct errors and deficiencies in the design documents prior to submitting them to the Department for review. Minimally, the Plan should identify design engineer, detailer, checker, QA engineer, and Engineer in Responsible Charge by organization, name and resume, including subconsultants and interface among design consultants.

104.03 Department Approvals and Review of Design Work

The Design Manager shall perform all of the design oversight reviews. Department will participate in these reviews. Under this procedure, the Design Manager will provide Department with draft design plans for review and approval to confirm that the design work complies with the requirements of the Contract Documents, especially Section 2.4, Part 4-General Conditions of Contract and the Standard and Reference Documents listed in Section 2.1, Part 2-Technical Information and Requirements, prior to initiation of construction activities on the Project.

Department’s review, comment, and/or approval of drawings, specifications, and other design submittals shall not be deemed to transfer any liability from the Design-Builder to the Department. The Department will perform all design reviews and conferences within the time limits of the Contract, and the Design-Builder shall provide responses and revisions in accordance with the Contract provisions.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

Drawings, specifications, and other design submittals shall be submitted to the Department for review and approval in accordance with the Contract. The Design-Builder shall provide to the Department ten (10) sets of the interim design submissions as described herein. Submittals shall be made in logical subsections that generally correspond to the Department's concurrent engineering process, including but not limited to : (i) Preliminary Field Inspection ("PFI"); (ii) Field Inspection and Right-of-Way ("FI/RW"); (iii) additional interim design submissions that the Department may require; and (iv) and Construction Documents as set forth in Section 2.4, Part 4- General Conditions of Contract.

Any review comments made by the Department will be provided, in writing, to the Design-Builder. The Department will provide timely reviews per the Contract and (where required) approvals of interim design submissions, drawings, specifications, and other design submittals consistent with the turnaround times set forth in Design-Builder's schedule, provided that Department shall have twenty-one (21) days after receipt of such submissions to act upon such submissions unless otherwise provided for in the Contract.

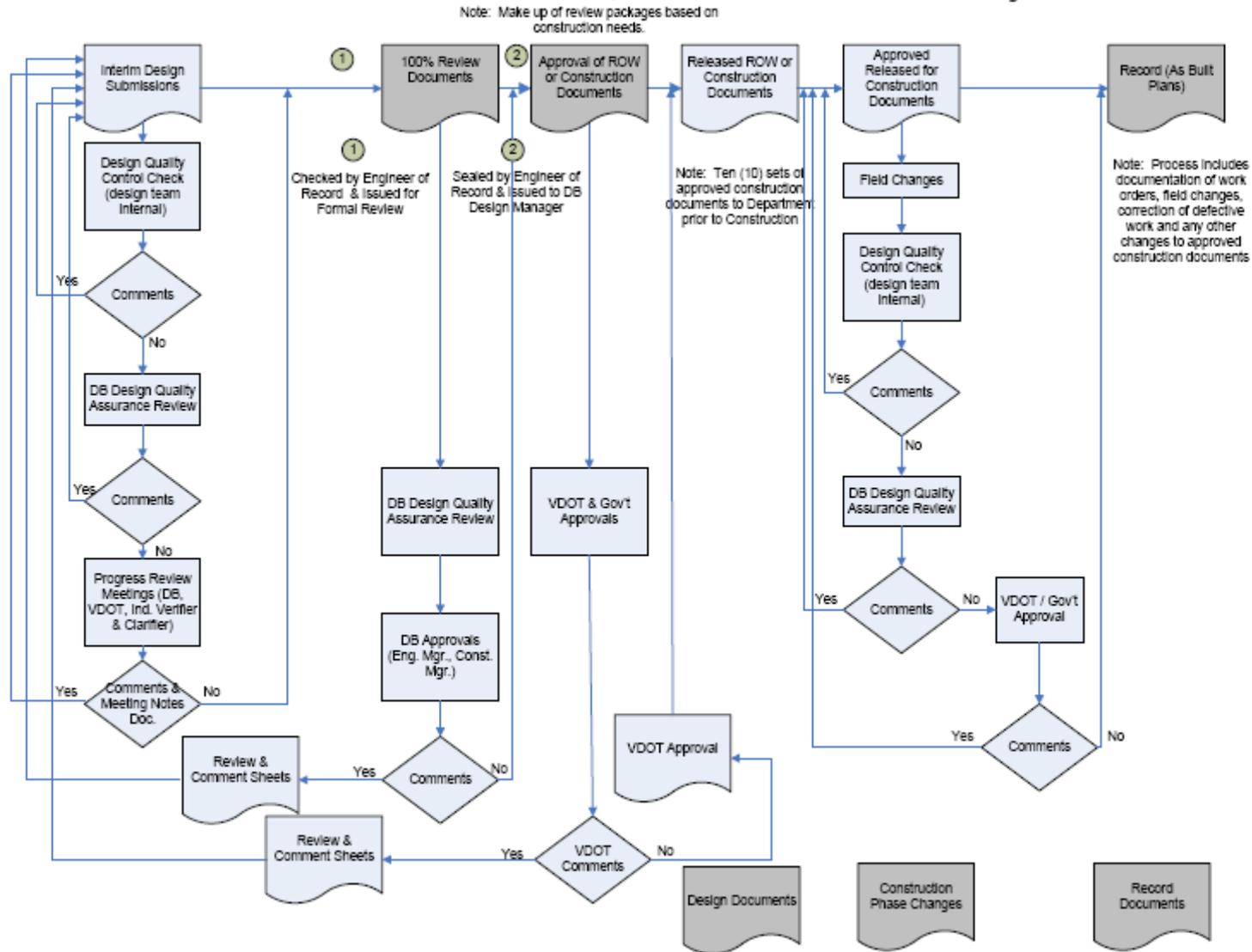
The Design-Builder shall be solely responsible, at no additional cost to the Department, for the schedule impacts and costs of revisions arising from the Department's review of the drawings, specifications, and other design submittals for consistency with the requirements of the Contract and caused by the Design-Builder's noncompliance with Contract requirements.

104.04 Quality Assurance and Quality Control of Design and Field Changes

Changes, including field changes, in the design of the Project or any portion thereof as shown on the Construction Documents, shall be subject to design QA and QC measures and procedures commensurate with those applied to the original design of the portion of the Project being changed. Further, all changes described in this Section 104 shall be approved in writing by the organization that performed the original design, with the additional written acknowledgement and approval of the change by the Design Manager with recommendation for approval by the Department. Documents containing design and /or field changes shall be distributed according to the requirements of this Section 104. A sample flow chart depicting the design quality management, review, and approval process is shown in Figure 104-1.

DESIGN-BUILD DESIGN APPROVAL & QUALITY MANAGEMENT PROCESS

Figure 104-1



SECTION 105 - CONSTRUCTION QA/QC PLAN REQUIREMENTS

105.01 General

Minimally, the Construction Quality Assurance and Quality Control plan must address the following:

- A. Describe the Design-Builder's Quality Control organization and Quality Assurance organization, including the minimum number of full-time equivalent employees with specific Quality Assurance and Quality Control responsibilities and including an organizational chart showing lines of authority and reporting responsibilities;
- B. List by discipline the name, qualifications, duties, responsibilities and authorities for all persons proposed to be responsible for Construction Quality Assurance and Quality Control;
- C. How QA/QC activities will be reflected in the project progress schedule integral to Work Package requirements as set forth in Section 6.2.1.2, Part 4 –General Conditions of Contract;
- D. Submittal schedule integral to Work Package requirements as set forth in Section 6.2.1.2, Part 4 – General Conditions of Contract;
- E. Inspection requirements including a detailed description of testing and inspection activities and frequencies that meets the minimum requirements outlined in the attached Appendix 1 Table 105-4 and Appendix 2, Table 105-5. It is imperative that the Design-Builder's Plan adequately distinguish between the separate functions of Quality Control and Quality Assurance, as described in this document;
- F. Quality Control sampling, testing, and analysis plan with frequencies, location and methods that includes a description of how random locations for testing and sampling are determined;
- G. Instrumentation and survey monitoring for verification of the performance of the project geotechnical features;
- H. Load testing and integrity testing required to verify adequacy of the foundation capacity, soil reinforcement elements, or adequacy of ground stabilization;
- I. Identify the laboratory(s) to be used for each type of testing;
- J. Specify documentation for QA and QC activities;
- K. Procedures to meet the Department's requirements for corrective action when Quality Control and/or Quality Assurance criteria are not met.

The Contract may also require specific Quality Control and/or Quality Assurance measures for certain materials. When so required, the Design-Builder shall provide all personnel, equipment, supplies, and facilities necessary to perform Quality Control and Quality Assurance, obtain samples, and perform tests required in the Contract.

Both the Design-Builder's Quality Control and Quality Assurance components of its QA/QC Plan shall contain separate inspection plans for each construction work item included in the Project whether performed by the Design-Builder or a subcontractor or vendor. Work items may be definable features or items of work meeting the requirements set forth in Article 6, Part 4 - General Conditions of Contract.

The Design-Builder shall provide both Quality Control and Quality Assurance inspection for all work activities and Work Packages for conformance with the construction requirements in the Contract.

The Design-Builder's QA/QC Plan shall use industry standard inspection procedures as well as those outlined in VDOT's Construction Manual, Materials Manual of Instruction, Road and Bridge Standard Specifications and the minimum requirements outlined in the attached Appendix 1, Table 105-4 and Appendix 2, Table 105-5.

During the design of the project, each item of work shall be reviewed to determine what significant characteristics of the item need to be monitored during construction in the field. This review is to ensure

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

that the completed Project will function in accordance with the design intent over its expected lifetime. The inspection plans shall include the appropriate criteria, tests, and inspection requirements identified in the Department's Road and Bridge Specifications, Construction Manual, and Materials Manual, and requirements as set forth herein. The following elements shall be addressed within each item inspection plan:

1. Identification - Work items included in the plan.
2. Characteristics - What characteristics of the item(s) will be inspected.
3. Acceptance Criteria - Directly or by reference, provide sufficient information for the inspector to use to determine if the item or activity is acceptable or not.

Maximum use of checklists shall be made for this purpose. The plan should indicate what action will be taken for items found to be non-conforming.

Inspections shall be performed during all phases of the project from notice-to-proceed to final acceptance in order to assure that the work meets, and is being performed in accordance with the Contract.

An examination of the quality of workmanship shall also be conducted to confirm that all work is being performed in accordance with all construction documents and contract requirements.

Appropriate follow-up inspections, sampling and testing of materials shall be performed to satisfy minimally the frequencies shown in Appendix 1 Table 105-4 and Appendix 2, Table 105-5 as each item of work progresses to assure consistency in workmanship, compliance with contract requirements including design and construction documents, and to assure satisfactory performance of the work in service.

105.02 Department Responsibilities

Independent Verification sampling and testing will be performed by the Department to validate Design-Builder Quality Control and Quality Assurance sampling and testing. An Independent Assurance Program will also be conducted by the Department to evaluate all sampling and testing used in the acceptance of material.

The Design-Builder shall certify that all of the Work has been completed in conformance with the requirements of Contract Documents.

The Department shall hold final authority for determining the acceptance of materials incorporated into the Project. The acceptance decision will consider results of Design-Builder Quality Control and Quality Assurance sampling and testing at specified frequencies and locations, the Department's Independent Assurance and Independent Verification sampling and testing at specified frequencies and locations, inspection by the Department of the attributes and processes that may affect the quality of the finished product, and any dispute resolution procedures to resolve discrepancies between the verification sampling and testing and the Design-Builder sampling and testing.

105.03 Design-Builder Responsibilities

The Design-Builder shall be responsible for the quality of construction and materials incorporated into the project. The Design-Builder's Quality Control and Quality Assurance measures shall insure that operational techniques and activities provide material of acceptable quality. Design-Builder sampling and testing shall be performed to control the processes and determine the degree of material compliance with the Contract.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

The following Table **105-2** details comparison tolerances for testing which will trigger the referee and disputes processes:

| Table 105-2 | | |
|---|--|------------------------------|
| Test | IA Comparison Tolerance | Source |
| Soil/ Aggregate Wet Density using Nuclear gauge in Direct Transmission | CL Soil – 1.91 pcf ML Soil – 2.15 pcf SP Soil – 1.86 pcf | AASHTO T-310 |
| Soil/Aggregate Density using Sand Cone | 2.0 pcf | ASTM D1556 |
| Soil/Aggregate Moisture using Nuclear gauge (backscatter) | CL Soil – 1.44 pcf ML Soil – 1.63 pcf SP Soil – 2.10 pcf | AASHTO T-310 |
| Soil/Aggregate Moisture determined by oven dry | 14% difference* | ASTM D2216 |
| One Point Proctor - density | 4.5 pcf | AASHTO T-99 |
| One Point Proctor - moisture | 15% difference* | AASHTO T-99 |
| Concrete Slump | 0.82 inch for 1” to 2” slump 1.10 inch for 3” to 4” slump 1.50 inch for 5” to 6” slump | ASTM C143 |
| Concrete Air- | 0.8% points using pressuremeter 32% difference using rollermeter | AASHTO T-152 AASHTO T-196 |
| Concrete Temperature | 1 degree F | ASTM C 1064 |
| Concrete Unit Weight | 2.31 pcf | AASHTO T-121 |
| Concrete Permeability | 51% difference* | AASHTO T 277 |
| Concrete Strength | 8% difference on the average of 3 cylinders | ASTM C39 ASTM C31 |
| Asphalt Bulk Specific Gravity | 0.02 | AASHTO T-166 |
| * Percent difference calculation shall be $\% \text{ diff} \leq \{(\text{absolute value}[W_1-W_2]) / ((1/2) * (W_1+W_2))\} * 100$ | | |

The testing of referee samples to resolve disputes will be performed by the Department. In addition to its testing responsibilities, the Department will also perform Independent Assurance and Verification inspections as outlined in Appendix 1, Table 105-4. See Section 105.10 Witness and Hold Points of this document and Appendix 2, Table 105-5 for more detail on IA and IV inspections that will be performed as Witness and Hold Points.

105.04 Preparatory Inspection Meetings

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

Prior to the start of any work activity the Design-Builder shall hold a Preparatory Inspection Meeting to ensure that all project personnel have a thorough understanding of the upcoming work. The purpose of the Preparatory Inspection Meeting is to provide coordination and communication between the Design-Builder's production personnel, QC personnel and QA personnel, as well as the Department's Independent Assurance and Independent Verification (IA/IV) personnel. Work activities and /or Work Packages generally correspond to the sections of VDOT's Standard Road and Bridge Specifications, such as clearing and grubbing, earthwork, aggregate base, and asphalt concrete, or a definable feature of work such as pre-paving conference, and pre-placement conferences for bridge decks.

The Preparatory Inspection Meeting should include discussions relating to what will be accomplished, by whom it will be performed, and where, when, and how the work will be done. The Preparatory Inspection Meetings are to ensure that all parties have the same understanding of the design intent, to confirm the completeness and suitability of the plans, to ensure that all parties have the appropriate plans, specifications and any special details, and are aware of safety regulations and procedures that need to be followed. At this time the Design-Builder's QC and/or QA approved inspection checklists for the specific work package or activity shall be reviewed to confirm completeness and suitability.

The Preparatory Inspection Meeting shall be completed just prior to the beginning of the scheduled activity; all preliminary documents shall be reviewed as outlined in Appendix 1 Table 105-4 and Appendix 2, Table 105-5.. The Department's IA/IV personnel shall be invited to attend the Preparatory Inspection Meetings but are not required to attend. The Meetings shall be planned and conducted by the Design-Builder QA Manager. Minutes of the meeting shall be taken by the QA Manager to document any clarifications and understandings related to the construction of the item that are not documented elsewhere. Meeting minutes will be distributed to all attendees, the Department's Project Manager and Department's IA/IV personnel if they are not present. Minutes shall be reviewed and finalized no later than 2 business days after the meeting or as otherwise stipulated in Department Construction Directive, CD 2004-1. Preparatory Inspection Meetings are classified as hold points and shall be identified in the Design-Builder's QA/QC plan and in the CPM Schedule.

105.05 Design-Builder Sampling and Testing

Design-Builder field and laboratory sampling and testing shall be performed at frequencies specified in the minimum requirements outlined in Appendix 1 Table 105-4, Appendix 2, Table 105-5,.., the current VDOT Standard Road and Bridge Specifications and the Materials Manual of Instructions and other documents as appropriate and approved by the Department and /or as otherwise specified in the Contract. Sampling and testing shall be performed by qualified testing personnel as defined in Section 103 of this document. The Design-Builder shall furnish copies of all test results (both QA and QC) to the Department's Project Manager or other authorized Department representative within 24 hours of completing the test result of the acquired sample or the next day of business.

The Design-Builder shall provide to the Department a testing plan for each material type that meets the minimum frequencies referenced above for separate Quality Control and Quality Assurance testing. The testing plan shall be developed using a random selection process such as ASTM D 3665 and shall reflect the proposed total project quantity as may be calculated in the project drawings, specifications, and/or other design submittals. The testing plan shall be submitted and approved by Design-Builder's QAM with recommendation for approval by the Department prior to the beginning of production or placement of the material.

105.06 Design-Builder Laboratories

All sampling and testing shall be performed by a laboratory that is either:

- A. accredited in the applicable AASHTO procedures by the AASHTO Accreditation Program (AAP); or

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

B. complies with the requirements of AASHTO R18 (18th Edition) for those tests to be performed and compliance with R18 for those tests not covered by ASSHTO Material Reference Laboratory (AMRL); or

C. a laboratory approved by the Department's Materials Division or other accreditation program meeting the requirements of R18.

105.07 Records

The Design-Builder shall prepare separate test reports for both Quality Control and Quality Assurance meeting the requirements of AASHTO R18 or may use the current appropriate Department forms. The Design-Builder shall also prepare, maintain, and submit to VDOT's CIV Manager completed test records and final materials certification in accordance with the requirements of VDOT's Construction Manual, Materials Manual of Instruction, this Section 105 and Appendix 1 Table 105-4 and Appendix 2, Table 105-5.

105.08 Independent Assurance Inspection

The Design-Builder's laboratory shall participate in the Department's Independent Assurance Sampling and Testing Program. Findings of all Independent Assurance observations and test results will be provided to the Design-Builder's QA Manager by the Department's Project Manager. Failing test results will be communicated immediately to the QA Manager by the Department's Project Manager or designated authorized representative. The Design-Builder shall immediately take corrective action to resolve any noted deficiencies.

105.09 Acceptance

105.09.01 Plant Manufactured Materials Acceptance

All plant manufactured materials shall be tested at the plant and accepted by the Department in accordance with the current Department QA/QC program as described in the Department's Materials Manual of Instruction. Field testing for density shall be the responsibility of the Design-Builder for Quality Control and the QAM for Quality Assurance. See Section 105.12 Department Inspected and Tested Items of this document for more information.

A cooperative effort by the Department and the Design-Builder to identify the cause of the non-specification material or the discrepancy in the test results will include the following actions:

- A. A check of test data, calculations and results
- B. Observation of the Design-Builder's sampling and testing by the Department's Project Manager
- C. Check of test equipment by the Department's Project Manager

When the source of test result discrepancies between the Design-Builder and the Department's laboratories cannot be resolved, a referee split sample shall be obtained and test; this work will be performed by the Department. The testing of the sample will be performed in duplicate by the laboratory without knowledge of the specific project conditions such as the identity of the Design-Builder, the test results of the Department or Design-Builder, or the specification targets. The results of these tests will be binding on both the Design-Builder and the Department. The Design-Builder or its representative may witness the testing if requested. Costs incurred for referee testing will be paid by the party found in error, at the established laboratory rates.

For materials identified in the Contract and/or Design-Builder's proposal as being subject to acceptance with a price adjustment, standard VDOT price adjustment procedures as identified in the Contract and RFP will be followed based upon the actual field quantities and the prices stated in the Design-Builder's proposal. Items requiring price adjustments will be identified in the RFP and will be addressed in the Design-Builder's proposal to the Department as required in the RFP. Materials for which a price adjustment is not identified in the Design-Builder's proposal will be negotiated on a case-by-case basis

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

between the Department and the Design-Builder. The Department is not obligated to negotiate a price adjustment on any material not identified in the Request for Proposal or the final executed Contract and may reject and require replacement of any materials that do not meet specifications at its sole discretion.

105.09.01.01 Quality Assurance Auditing and Nonconformance Recovery Plan Requirements

The Design-Builder shall establish and maintain a Quality Assurance Auditing and Nonconformance Recovery Plan (AR Plan) for uniform reporting, controlling, correction and disposition and resolution of nonconformance (including disputed nonconforming items) issues that may arise on the Project. The Design-Builder's AR Plan shall establish a process for review and disposition of nonconforming material, equipment or other construction and design elements of the Work. The AR Plan shall specifically address a recovery plan to increase QA and QC testing frequencies for tests that fail to meet comparison tolerances as set forth in Table 105-2.

Further, the AR Plan shall clearly delineate the Design-Builder's procedures for addressing construction and design deficiencies in the Work. Such procedures shall include increased QA and QC testing frequencies and other quality management features as necessary to achieve the desired quality Work product. The Design-builder's deficient work and QA processes shall be completed in such a manner as not to cause additional oversight by the Department.

In addition to the requirements outlined in Section 2.10, Part 4 –General Conditions of Contract, the Design-Builder's AR Plan shall include recovery measures necessary to commence correction of such nonconforming Work, including the correction, removal or replacement of the nonconforming Work and any damage caused to other parts of the Work affected by the nonconforming Work, at no additional cost to the Department. Upon Department's requests, a recovery plan shall be developed and submitted for Department review and approval. The timing for the recovery plan submission shall be in accordance with the requirements of Section 2.10.2, Part 4, and General Conditions of Contract.

Where deficiencies in the Work can be corrected, the Design-Builder QA Manager shall cause performance of such corrective action as is appropriate. Re-tests or inspections shall be made by the Design-Builder QA Manager to determine the acceptability of the materials after corrective measures have been taken. The cost of removing, replacing or correcting defects in the materials will be the sole responsibility of the Design-Builder, and no additional cost to the Department. The cost of repairing or replacing other materials damaged by the removal, replacement or correction of defects in the materials shall be the sole responsibility of the Design-Builder and no additional cost to the Department.

Control procedures shall provide for identification, evaluation, segregation and, when practical, disposition of nonconforming material equipment or other elements of the Work and for notification to the Design-Builder QA Manager's Project Manager the Department Project Manager and all personnel involved in the affected Work The responsibility for review and for the disposition of nonconforming material equipment or other Work shall be as established by the Design-Builder's QA /QC Plan and at a minimum shall provide for the following:

1. Nonconformance Procedures - Maintain and use procedures that define methods and responsibilities for identification, documentation, control, and processing of nonconforming items. A nonconformance exists when equipment, parts, materials or services exhibit deficiency in physical characteristics, functional performance, or documentation. Apply nonconformance procedures to all items, including actions associated with installation and construction which fail to conform as specified or to other product descriptions. Develop a Nonconformance Report (NCR) form to

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

document and provide the following information:

- A. Identification of nonconformances
 - B. Documentation
 - C. Evaluations/recommendations
 - D. Separation/removal/tagging
 - E Recommendation for “repair” or “use as is” dispositions
 - F. Cause of nonconformance
 - G. Proposed corrective action to prevent recurrence
 - H. Responsibility for accomplishing corrective action
 - I. Schedule for resolution
2. Nonconformance Log - Develop and maintain Nonconformance Log to enable tracking of nonconformances. Include necessary information to trace nonconformance back to initial documentation and to summarize status
 3. Reports and Disposition - Respond to the NCRs by date specified on NCR and include investigative actions, causes of nonconformances, how nonconformances were dispositioned, and corrective actions taken. Dispositions of “use as is” and “repair” for nonconforming items require review and Acceptance by the Department Project Manager and concurrence by the Design-Builder Design Manager.
 4. Status Tags - Define procedures for controlling use, logging, installation, and authorized removal of status tags. Authorization for removal can be approved only by originator of NCR or that person’s supervisor, and only when demonstrated that nonconforming item meets acceptance criteria or has been reviewed and Accepted for use by the Department Project Manager. Unauthorized removal of nonconformance status tags is prohibited.
 5. Corrective and Recovery Action - The Design-Builder’s QA/QC Plan shall establish and maintain written procedures for
 - A. Investigating the cause of nonconforming material equipment or other elements of the Work and the corrective action needed to prevent recurrence (such as increased sampling and testing frequencies, etc.)
 - B. Analyzing all processes, work operations, concessions, quality records, service reports, and audits to detect and eliminate potential causes of nonconforming material equipment or other elements of the Work
 - C. Initiating preventive actions to deal with problems at a level corresponding to risks/deficiencies encountered
 - D. Applying controls to ensure that effective corrective actions are taken
 - E. Implementing and recording changes in procedures resulting from corrective action.

Any deficient condition, whether the result of poor workmanship, use of materials containing defects, damage through carelessness or any other cause, found by, or disclosed to, the Design-Builder QA Manager and/or Department Project Manager shall be removed and replaced by work and materials which conform to the Contract Documents or shall be remedied. Upon failure on the part of the Design-Builder to comply promptly with any order to remedy, remove or replace Work which is nonconforming or contains defects, the Department Project Manager will notify the Design-Builder QA Manager that payment shall be withheld

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

not only for that portion of the Work in nonconformance, but for that portion of the quality plan Work Package shown in the CPM schedule. The Department Project Manager may also cause such nonconforming Work or deficiency to be remedied or removed and replaced by separate contractors employed by the Department at the Design-Builder's expense. In such event, the costs of such removal, remediation and replacement shall be deducted from any monies due or to become due the Design-Builder under the Contract.

In the event the Design-Builder QA Manager and/or Department Project Manager finds, as a result of monitoring of the Design-Builder quality assurance and quality control activities, that any materials, equipment or the finished product in which materials, equipment or finished product are used are not in conformity with the Contract requirements, but that acceptable Work has, nonetheless, been produced, the Department Project Manager shall then make a determination as to whether the Work shall nonetheless be accepted. If the Department Project Manager determines that the Work should be accepted, the Design-Builder shall initiate a Change Order which will provide for an appropriate adjustment in the Contract Price. Any such acceptance shall not, however, ever result in an increase of the Contract Price.

1. Right of Rejection - If damage, defect, error, or inaccuracy is found in any specified item or Work, the Department has right to put the Design-Builder QA Manager on notice of corrective action to bring item or Work into conformance with Contract requirements.
2. Correction Costs - Costs incurred in correcting rejected items or Work will be borne by the Design-Builder. Remove rejected items from the Project unless in-place correction is reviewed and accepted by the Department.
3. Investigative Costs - Provide test apparatus and labor to investigate, inspect, and test defective Work or nonconforming materials. Correct deficiencies if construction or materials are in nonconformance.

If the Department Project Manager so directs at any time prior to Final Acceptance, the Design-Builder shall remove or uncover such portions of the finished Work as may be directed. After examination, the Design-Builder QA Manager shall restore such portions of the Work to the standards required by the Contract.

Should the Work thus exposed or examined prove acceptable the Design-Builder may submit a Change Request for an adjustment in the Contract Price and, if appropriate, Contract Time for the Work subject to, and in accordance with,, Changes in the Work, for the uncovering or removing and replacing of the covering or making good of the finished Work, Section 105.09.01, Part 5- Division I Amendments to the Standard Specifications. Should the Work so exposed or examined prove unacceptable, the uncovering or removing and replacing or satisfactorily improving shall be at the Design-Builder's sole expense and time.

105.09.02 Rejected Material

The following action shall be undertaken with regard to defective materials:

- A. Rejected by Design-Builder (QC or QA): The Design-Builder may elect to remove any defective material and replace it with new material at no additional cost to the Department. Any such new material shall be sampled, tested and statistically evaluated for acceptance in accordance with the Design-Builder's QA/QC Plan.
- B. Rejected by the Department (IV or IA): The Design-Builder shall remove any defective material and replace it with new material at no additional cost to the Department. For materials identified as being eligible for acceptance with a price adjustment, a price adjustment shall be applied as described in Section 105.09.01.

105.09.03 Non-Statistical Acceptance of Small Quantities of Materials

The Department may elect to allow the QA Manager to accept small quantities of materials without normal sampling and testing frequencies. The determination to accept materials using this provision rests solely with the Department. Structural Concrete will not be considered under the small quantity definition.

An item can be accepted as a small quantity if the proposed project quantity for a specific item is less than one subplot or one-half of a subplot for mainline paving.

Factors that the Department will consider prior to use of small quantity acceptance are:

- A. Has the material been previously approved?
- B. Is the material certified?
- C. Is there a current mix design or reference design?
- D. Has it been recently tested with satisfactory results?
- E. Is the material structurally significant?

Small quantity acceptance may be accomplished by visual, certification, or other methods. Acceptance of small quantities of materials by these methods must be fully documented. Documentation of materials under these methods must be provided by the QA Manager accepting the material. For visual documentation, an entry should be noted on field records, with a statement as to the basis of acceptance of the material and the approximate quantity involved. A separate list of items and quantities accepted on visual inspection shall be maintained by the QA Manager.

105.10 Witness and Hold Points

Witness and Hold Points shall be established where notification of the Department is required for the Department's option of observing or visually examining a specific work operation or test. Witness Points are points identified within the QA/QC Plan and CPM schedule which require notification of the Department. Work may proceed beyond a witness point with or without participation by the Department provided proper notification has been given. Hold Points are mandatory verification points identified within the QA/QC Plan and CPM schedule beyond which work cannot proceed until mandatory verification is performed and a written release is granted by the Department. Witness and Hold Points shall be identified in the construction process and CPM schedule where critical characteristics are to be measured and maintained, and at points where it is nearly impossible to determine the adequacy of either materials or workmanship once work proceeds past this point.

105.10.01 Witness and Hold Point Coordination

The Design-Builder's QAM shall designate a primary point of contact for notifications for inspection at hold points and witness points. An alternate individual may be designated to function in this capacity in his/her absence. The Department's Project Manager or designee will be designated to handle responses to the Design-Builder with written reports or releases for hold and witness points.

The time necessary to respond to the notification for inspection at hold and witness points shall be stated in the Design-Builder's QA/QC Plan, mutually agreed to by both the Design-Builder and the Department and incorporated in the Design-Builder's CPM schedule.

105.10.02 Hold Points – Minimum Requirements

Project specific hold points may be identified in the RFP. In addition, the Design-Builder shall identify all Preparatory Inspection meetings, Design Development Services submissions as identified in Section 2.4, Part 4, General Conditions of Contract, Environmental submittals, Certifications and Permits, and Governmental Approvals as hold points and shall identify other hold points in its QA/QC Plan to allow

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

the Department to perform its IA and/or IV functions as identified in Appendix 1 Table 105-4 and Appendix 2, Table 105-5.

105.10.03 Witness Points – Minimum Requirements

Project specific witness points may be identified in the RFP. In addition, the Design-Builder shall identify other witness points in its QA/QC Plan to allow the Department to perform its IA and/or IV functions as identified in Appendix 1 Table 105-4 and Appendix 2, Table 105-5.

105.11 Performance Verification of Project Geotechnical Elements/Features

The Design-Builder's QA/QC plan shall include inspection and verification tests to determine the integrity of foundation structures and elements and to verify that their performance is as anticipated from the design and other Geotechnical requirements as set forth in Section 2.0, Part 2-Technical Information and Requirements. For drilled shaft foundations where water or slurry is present above the base of the shaft, Crosshole Sonic Logging (CSL) testing shall be conducted to verify the integrity of the shaft. Results of the CSL testing shall be reviewed by the Design QAM and Construction Manager before submittal to the Department.

Walls shall be designed for expected total and differential settlements based on site geotechnical analyses performed by the Department and/or the Design-Builder. The Design-Builder's QA/QC plan shall include inspection, wall face tolerance and deflection measurements, and verification and proof tests for anchors and soil nails, to determine the integrity of foundation structures and wall elements, and to verify that the wall performance is as anticipated from the design.

The Design-Builder shall utilize geotechnical instrumentation as necessary to verify the performance of areas of significant cuts or fills regarding deformation and stability, in particular where soft or otherwise unstable ground is present, or to control filling or cutting rates to maintain stability. An instrumentation and monitoring plan, including criteria which will be used to determine acceptance, shall be included in the Design-Builder's QA/QC plan.

If soil densification or other foundation soil stabilization techniques are used, the Design-Builder's QA/QC plan shall address how the integrity and success of the soil densification technique will be investigated, monitored, and compared to the intended design.

105.12 Department Inspected and Tested Items

The Design-Builder shall identify to the Department any and all off-site fabricated materials from producers not in an existing Department QA/QC program. The inspection of project specific fabricated items will be accomplished by the Department using its own forces and/or Department agent. To facilitate these inspections, the Design-Builder will promptly notify the Department of the intended fabricator and provide two copies of the Approved Shop Drawings. In addition, the Design-Builder shall submit a Source of Materials, Form C-25, for those materials for all materials for which the Department retains responsibility for testing.

See Table **105-1** below for a listing of materials for which the Department retains responsibility for testing. The Department, using its own resources, will provide inspection and testing of all off-site fabricated materials as outlined in the following table:

| Table –105-1 | |
|---|---|
| Item | Point of Contact |
| Prestressed Concrete Structural Elements (beams, girders(AASHTO and bulb-T), and piles | Central Office Materials – Structures Section |
| Metal Traffic Signal and Light Poles and Arms | Central Office Materials – Structures Section |
| Structural Steel Elements (beams and girders) | Central Office Materials – Structures Section |
| Precast Concrete Structures | Central Office Materials – Physical Lab |
| Pipe (concrete, steel, aluminum and high density polyethylene) for culverts, storm drains and underdrains | Central Office Materials – Physical Lab |
| Asphalt Concrete Mixtures | District Materials Section |
| Hydraulic Concrete Mixtures | District Materials Section |
| Aggregate (dense and open graded mixes) | District Materials Section |

105.13 Inspection Documentation

Each of the Design-Builder's QC inspectors and QA inspectors and technicians shall summarize their daily inspections, tests and material sampling activities in a daily report. The Department's Inspectors Daily Work Report or a similar form as approved by the Department shall be used for maintaining a written record of inspection results. Copies of the inspector's records shall be provided to the Department's Project Manager daily. The report shall consist minimally of the following key points of record:

1. Work performed by the firm, subcontractor, or material supplier, identified by Work Package notation.
2. Weather conditions.
3. Inspections performed and their results.
4. Communications.
5. Type, location, and results of all tests performed.
6. Delays encountered.
7. Identify any safety related problems and corrective action taken.
8. Identify all non-conforming work and the corrective action taken.
9. Signature of inspector.

105.13.01 Inspection Documentation and Reporting Process

The Project shall be constructed in accordance with standards and requirements related to construction, safety, quality assurance and quality control as required in the Contract Documents and Appendix 2, Table 105-4. The objective of Table 105-4 is to identify and summarize minimum inspection, sampling and testing coverage and frequencies; verification and observation schemes, and documentation and reporting requirements to be included in Design-Builder's Quality Assurance (QA) and Quality Control (QC) Plans ("QA/QC Plan"). The Department's Project Manager will review the Design-Builder's QA/QC Plan for conformance with the requirements as set forth in the Contract. The Design-Builder shall not begin any construction activities without the Department's approval of the Design-Builder's QA/QC Plan.

The Design-Builder's Quality Assurance Manager shall maintain the Project's Materials Book, recording materials used, source of material and method of verification used to demonstrate compliance with Department standards. The Materials Book shall be maintained according to VDOT Materials Division requirements and will be reviewed on a monthly basis by the Department's Project Manager. The monthly review shall consist of spot checking at least 5 materials and their source documentation.. Minimally, the Department Project Manager will review all components of the materials notebook during the first 2 months of commencement of Design-Builder's planned or scheduled field operations to ensure all records are set up correctly. The QA Manager shall also maintain Project daily reports and shall be responsible for approval of all Inspectors' Daily Reports.

The Quality Assurance Manager shall approve all Materials Test Reports prior to submission to the Department. The QA Manager's approval of Materials Test Reports shall also include those for which VDOT retains responsibility for review and acceptance.

Design-Builder's QA and QC staff shall be responsible for Project documentation, testing and inspection; the Department's Project Manager will be responsible for ensuring that the Design-Builder conforms to its approved QA/QC Plan and maintains appropriate Project documentation. The Department will also be responsible to administer Independent Assurance and Independent Verification sampling and testing of materials used during construction of the Project.

105.13.02 Department Inspection Validation and Administration Process

As set forth in Section 105.11, Part 5- Division I Amendments to the Standard Specifications, the Department shall have the right to audit, monitor, inspect and test the Work as it progresses and Design-Builder shall accommodate this process. Appendix 2, Table 105-5 delineates Department's construction oversight of items of work and identifies requirements for Preparatory, Intermediate, and Completion Inspections to be performed by the Design-Builder. Additionally, the Department will perform Independent Verification, Independent Assurance testing and Independent Assessment and Owner Independent Validation testing, observations and oversight as set out in this Section 105 and Appendix 2, Table 105-5.

105.13.03 Preparatory Inspections

Prior to the start of each new construction phase, type of work or after a change in previously approved types of materials, the Design-Builder's QA Manager and Construction Manager shall meet with the Department's Project Manager for the Preparatory Inspection for that work. The purpose of the Preparatory Inspection is to verify that the pre-construction activities, such as approval of design documents, material approvals, scheduled inspections, and test types, locations and frequencies have been satisfactorily completed prior to beginning the work.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

At the Preparatory Inspection, the Quality Assurance Manager shall identify the type and frequency of inspections that will be performed by the QA and QC personnel, as documented in the QA/QC Plan as approved by the Department. All Project work activities shall be preceded by a Preparatory Inspection as identified in this Section 105.13.03 and Appendix 2, Table 105-4.

105.13.04 Intermediate Inspections

Throughout the course of construction, the Design-Builder shall accommodate Department's performance of Intermediate Inspections. Details regarding the frequency and types of inspections are described in this Section 105.13.04 and Appendix 2, Table 105-4.

105.13.05 Completion Inspections

Some types of work may not require intermediate inspections but will require inspections by the Department upon substantial completion. Completion Inspections will allow the Department Project Manager's verification that all necessary and supporting documentation is available to support Design-Builder's application for final payment as identified in the approved CPM schedule.

105.13.06 Punch out Inspection

Design-Builder shall be responsible for punch out inspection. The punch list shall be maintained by the Design-Builder's QA Manager and shall be created near the end of the Project or at the time of Substantial Completion. The punch out inspection shall be performed on all definable features of the Work, against approved Construction Plans, Specifications and other related Construction Documents and note any discrepancies thereof. The Design-Builder's QAM shall review the project records to ensure that all items addressed by non-conformance reports; including areas where Owner Independent Verification and Owner Independent Assurance testing produced discrepancies; have been corrected, or have been included on the punchlist for corrective action.

The Department will monitor the development of the Design-Builder's punchlist for the Project. The Department will review the Design-Builder's punchlist documentation prior to the final acceptance walkthrough to determine that all punchlist activities have been performed and shall physically verify correction of 10% of the punchlist items in the field. Discrepancies found in the physical verification by the Department will result in a greater percentage of physical verification of punchlist items depending on the severity, at Design-Builder's sole expense. Increase in frequency or percentage of verification will be made at Department's sole discretion.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

105.14 Construction Inspection Checklists

The Design-Builder's QA/QC Plan shall include inspection checklists for all anticipated construction operations and/or processes. These checklists shall be used by the Design-Builder's QA and QC inspection personnel. The individual checklists shall be approved by the Department as part of the overall approval of the Design-Builder's QA/QC Plan. The checklist for each work activity shall include the construction requirements stated in the standard specifications or Contract for that work activity. As a minimum each checklist shall address the following as shown in Table 105-3:

| Table 105-3 Construction Inspection Checklist | |
|--|--|
| Date and Time | Date and time inspection was performed |
| Location: | <ol style="list-style-type: none"> 1. Pier or structure component 2. Drainage Structure Number 3. Compaction Report (referenced to Centerline Station and Subgrade Elevation, etc.) |
| Specification Requirement: | List of applicable specifications for this item |
| Frequency: | Indicated test or inspection frequency, if any |
| Items Inspected: | List of elements or items inspected |
| Conformation to Specifications: | Check that work and materials meet the appropriate specification/standard |
| Deficiencies Noted: | Note any deficiencies to specifications/standards |
| Individual Notified: | Individual notified for corrective action |
| Corrective Action Noted: | What form of corrective action is recommended |
| Action Taken: | What corrective action was taken |
| Material Documentation: | List and attach a copy of all required documentation (test reports – such as, but not limited to, compaction, aggregate gradation, mill tests, manufacture's certification, and catalog cut or product specifications. |
| Responsible Party Notified: | Name of the foreman or worker responsible for the work |
| Signature of Inspector: | Signature of Inspector who performed inspection |

The following is a sample checklist for Bridge Hydraulic Cement Concrete taken from the Department's Design-Build Independent Verification Guide which contains sample checklists for 32 different items. The Design-Builder may wish to develop the checklists for its QA/QC plan based upon this style of checklist.

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

| | |
|---|---|
|  | BRIDGE H.C.C. OPERATIONS INSPECTION FORM |
|---|---|

REPORT NO.: _____ DATE OF WORK: _____
 PROJECT NO.: _____ CONTRACTOR: _____
 LOCATION: _____
 PLAN PAGE: _____ INSPECTOR: _____

| ITEM | INSPECTOR (INITIAL) | DATE | REMARKS |
|---|---------------------|------|---------|
| PREPARATORY | | | |
| DESIGN DOCUMENTS APPROVED | | | |
| QA/QC PLAN REVIEWED & ACCEPTED | | | |
| OBTAIN AN APPROVED MIX DESIGN FOR ALL CONCRETE MIXES TO BE USED | | | |
| EQUIPMENT APPROVED | | | |
| INTERMEDIATE | | | |
| VERIFY DIMENSIONS AND ELEVATIONS OF FORM WORK | | | |
| FORMWORK AND REINFORCEMENT STEEL (CORRECT SIZE, TYPE, GRADE AND PLACEMENT) IAW PLANS, SPECS & CONTRACT PROVISIONS | | | |
| SHOP DRAWINGS SUBMITTED AND APPROVED FOR SIP METAL DECK FORMS | | | |
| CHECK DECK SCREED FOR PROPER OPERATION AND GRADE | | | |
| VERIFY WEATHER / TEMPERATURE LIMITATION REQUIREMENTS ARE IAW PLANS AND SPECS | | | |
| ENSURE AUTHORIZATION FOR PUMPING OF CONCRETE IS APPROVED BY ENGINEER | | | |
| VERIFY PLACEMENT SEQUENCE IAW PLANS, SPEC, AND CONTRACT PROVISIONS | | | |
| 2 INSPECTORS PRESENT DURING ENTIRE PLACEMENT OF CONCRETE | | | |
| OBSERVE PLACEMENT AND TESTING OF CONCRETE DURING PLACEMENT AND PERFORM INDEPENDENT VERIFICATION TESTING AS REQUIRED | | | |
| VERIFY LOCATION OF CONSTRUCTION JOINTS ARE IAW PLANS, SPECS, & CONTRACT PROVISIONS | | | |

Requirements for Quality Control and Quality Assurance Plans on
Design-Build Projects
August 20, 2007

| | | | |
|--|--|--|--|
| ENSURE PROPER BONDING AND WATERPROOFING OF CONSTRUCTION JOINTS | | | |
|--|--|--|--|

| ITEM | INSPECTOR (INITIAL) | DATE | REMARKS |
|--|---------------------|------|---------|
| INTERMEDIATE - Continued | | | |
| CHECK AND ENSURE REQUIREMENTS FOR FORM REMOVAL ARE MET | | | |
| ENSURE PROPER PROTECTION AND CURING METHODS ARE USED | | | |
| OBSERVE OVERDEPTH PROBES OF DECK CONCRETE AND VERIFY RECORDKEEPING OF SAME | | | |
| CONTROL CYLINDERS CURED IN SAME MANNER AS IN-PLACE CONCRETE | | | |
| VERIFY 28-DAY STRENGTH TESTS RESULTS IAW PLANS & SPECS | | | |
| CHECK DECK FOR IMPERFECTIONS AND REPAIR IF NECESSARY | | | |
| CHECK BRIDGE SEAT BEARING AREAS FOR LIMITS OF TOLERANCE | | | |
| COMPLETION | | | |
| VERIFY TESTING DOCUMENTATION FOR COMPLETION AND ACCURACY | | | |
| FINAL FIELD INSPECTION PERFORMED | | | |

REMARKS:

105.15 Project Communications

A timeline and process for making decisions and managing communications shall be established as part of the QA/QC Plan. These processes are to ensure that required information is provided in a timely and efficient manner and that decisions are made at the lowest appropriate level of authority. The processes shall include the guidelines for communications generated by the Design-Builder Team (designers, production forces, the QC personnel, and the QA personnel) and the Department.

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

Table 105.4: Part 1 – Material Testing

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|--|---|-------------------------|--|---|---|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| BACKFILL | Contract Special Provisions | | | | | |
| Moisture Density Relations – Standard Proctor, Atterberg Limits & Grain Size Analysis (All Backfill Types) | Density control of Embankments and Backfill (SP dated Nov 26, 2006) | VTM – 1, VTM-7 & VTM-25 | Once (1) weekly during production and with change in material. Change in material would be a change in the visual USCS soil classification (e.g. CL to CH) | Once (1) every five (5) weeks during production (20% of QC frequency). Samples are split from QC and results are compared against D2S | One (1) per year during production (1% of QA frequency); minimally perform one (1) in first five (5) tests taken for QA. Results compared against D2S. Performed by District Materials Staff. | Verify documentation of IA testing; minimally once (1) per year for project duration. Performed by Central Office or District (other than District Staff performing IA function) Materials Staff. |
| One Point Proctor Check with Sand Cone Density – Compare to Nuclear Gauge (Soils/Embankment) | Density control of Embankments and Backfill (SP dated Nov 26, 2006) | VTM 012 | Once (1) daily during production and with change of material. Change in material would be a change in the visual USCS soil classification (e.g. CL to CH) | Once weekly during production (20% of QC frequency). Samples are split from QC and results are compared against D2S | Once (1) per year during production; (1% of QA frequency); minimally perform one (1) in first five (5) tests taken for QA. Performed by District Materials Staff. | Verify documentation of IA testing; minimally once (1) per year for project duration. Performed by District Materials Staff. |

* Unless otherwise noted the Design-Builder’s QA testing frequency is relative to QC frequency and the Owner’s IA and IV frequencies are relative to the Design-Builder’s required QA frequencies. IA will be split samples and IV will be independent samples. QC will be performed in accordance with the requirements of Materials Manual of Instruction and Contract Specifications.

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|--|---------------|----------------|--|---|--|--|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| In Place Density Tests – Box Culverts and Pipes, Abutments & Retaining Walls, and MSE Walls | | VTM-10 | One (1) per 100LF length, each lift, alternating sides (alternating side apply to box culverts and pipes only); minimum one (1) test per 150CY; minimum one (1) test per work shift at each location and whenever there is a change in material or compaction equipment/method | One (1) test per 1500CY, minimally one (1) test every ten (10) days of production (10% of QC frequency) | (10% of QA frequency) One (1) per 15,000 CY minimally perform one (1) in first five (5) tests taken for QA Results compared against D2S. Performed by Project Staff | (10% of IA frequency) One (1) per year ; Results compared to Specifications Performed by Project Staff |
| | | | | | | |

| | | | | | | |
|---|---------------------|----------------------|-----------------|---|---|--|
| CAST-IN-PLACE STRUCTURES AND BRIDGE CONCRETE | VDOT Section 217 | | | | | |
| Concrete Entrained Air Content (CIP Concrete) | | ASTM C231 Or C173 | Test every load | One (1) test per 100CY (10% of QC frequency) | One (1) test per 500 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) test per 5000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. |
| Slump of Hydraulic Cement Concrete (CIP Concrete) | | ASTM C143 | Test every load | One (1) test per 100CY (10% of QC frequency) | One (1) test per 500 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) test per 5000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|---|---------------|----------------|---|---|---|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Temperature of Concrete (CIP Concrete) | | ASTM C 1064 | Test every load | One (1) test per 100CY (10% of QC frequency) | One (1) test per 500 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) test per 5000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. |
| Concrete Unit Weight | | ASTM C138 | Test Every Load | One (1) test per 100CY (10% of QC frequency) | One (1) test per 500 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) test per 5000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. |
| Compressive Strength of Concrete Cylinders (CIP Concrete) | | ASTM C31 & C39 | One (1) set of three (3) cylinders per every 100CY and at least one set per day | One (1) set of three (3) cylinders per every 1,000 CY (10% of QC frequency) | One (1) set of three (3) cylinders per every 1,000 CY, minimum one (1) set of three (3) cylinders per year, per project. Performed by Project Staff. | One (1) set of three (3) cylinders per every 10,000 CY, minimum one (1) set of three (3) cylinders per year, per project. Performed by Project Staff. |
| Chloride Permeability Concrete Cylinders (CIP Concrete) | | VTM 112 | One (1) set of two (2) cylinders per every 100CY and at least one set per day | One (1) set of two (2) cylinders per every 1000CY (10% of QC frequency) | One (1) set of two (2) cylinders per every 1,000 CY, minimum one (1) set of two (2) cylinders per year, per project. Performed by Project Staff. | One (1) set of two (2) cylinders per every 10,000 CY, minimum one (1) set of two (2) cylinders per year, per project. Per class of concrete, bridge and structures only. Performed by Project Staff. |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|---|---|------------------------|--|---|---|--|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Concrete Reinforcing Steel (CIP Concrete) | | ASTM A615 | Verify manufacturers certificates for every shipment for acceptance prior to placement | One (1) sample per manufacture per most common size per structure | One (1) sample per project, split from a QA sample. Sampled by Project Staff, tested by Materials Results compared against D2S. | One (1) sample per project, Sampled by Project Staff, tested by Materials Staff Results compared to Specifications. |
| SOILS / EMBANKMENT | Contract Special Provisions | | | | | |
| Moisture Density Relations Of Soils – Standard Proctor, Atterberg Limits & Grain Size Analysis (Soils/Embankment) | Density control of Embankments and Backfill (SP dated Nov 26, 2006) | VTM -1, VTM-7 & VTM-25 | Once weekly and with change in material | Once every five (5) weeks during production (20% of QC frequency). Samples are split from QC and results are compared against D2S | One (1) per year during production (1% of QA frequency); minimally perform one (1) in first five (5) tests taken for QA. Results compared against D2S. Performed by District Materials Staff. | Verify documentation of IA testing; minimally once (1) per year for project duration Performed by Central Office or District (other than District Staff performing IA function)Materials Staff |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|--|---|----------------|--|---|--|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| One Point Proctor Check with Sand Cone Density – Compare to Nuclear Gauge (Soils/Embankment) | Density control of Embankments and Backfill (SP dated Nov 26, 2006) | VTM 012 | Once daily and with change of material | Once weekly during production (20% of QC frequency). Samples are split from QC and results are compared against D2S | One (1) per year during production; (1% of QA frequency); minimally perform one (1) in first five (5) tests taken for QA. Performed by Project Staff | Verify documentation of IA testing, minimally once (1) per year for project duration. Performed by Central Office or District (other than District Staff performing IA function)Materials Staff |
| Embankment In Place Density (Soils/Embankment) | Density control of Embankments and Backfill (SP dated Nov 26, 2006) | VTM 10 | One (1) per 500LF interval each lift; minimum one (1) test per 500CY; minimum one (1) test per work shift at each location and whenever there is a change in material or compaction equipment/method | One (1) test per 5,000CY, minimally one (1) test every ten (10) days of production (10% of QC frequency) | (10% of QA frequency) One (1) test per 50,000 CY minimally perform one (1) in first five (5) tests taken for QA Results compared against D2S. Performed by Project Staff | (10% of IA frequency) One (1) per year; Results compared to Specifications Performed by Project Staff |
| | | | | | | |

| | | | | | | |
|--|--------------------------------|--|--|--|--|--|
| TREATED SUBGRADE / SUBBASE, AGGREGATE BASE MATERIAL, AND CEMENT TREATED AGGREGATE BASE MATERIAL | VDOT Sections 306, 307 and 309 | | | | | |
|--|--------------------------------|--|--|--|--|--|

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|----------------------------------|------------------|----------------|--|--|---|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Depth Checks | | VTM-38B | One (1) test per every half mile per lane width [Two (2) per mile per paver (mixer) width from 0 to 1 miles; Three (3) from 1 mile to 1 ½ miles; Four (4) from 1 ½ miles to 2 miles; Project divided into lots, each lot stratified and locations determined randomly] | One (1) test for every five (5) miles per lane (10% of QC frequency) | 10% of QA frequency One (1) test for every fifty (50) miles; minimally perform one (1) per roadway in first five (5) tests, taken for QA, Results compared against D2S Performed by Materials Staff | 10% of IA frequency One (1) per project or one (1) per year and every fifty (50) miles per lane width; which ever is greater; minimum one (1) per roadway. Results compared to Specifications Performed by Materials Staff |
| In Place Density | | VTM-10 | One (1) per ½ mile per lane width; average of 5 readings for each nuclear test | One (1) test for every five (5) miles per lane (10% of QC frequency) | First three (3) tests performed then 2% of QC frequency One (1) test every (50) miles per lane width; minimally perform one (1) per roadway in first five (5) tests taken for QA Results compared against D2S Performed by Project Staff | 10% of IA frequency One (1) project, per year and every ten (10) lane miles; Results compared to Specifications Performed by Project Staff |
| ASPHALT CONCRETE PAVEMENT | VDOT Section 315 | | | | | |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|--|------------------|--------------------|---|---|---|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Pavement Density by Nuclear Method with In Place Pavement Density by Cores serving the QA function (Asphalt Pavement) | | VTM-76, VTM-6 | Establish roller pattern, control strips and test sections. 10 stratified random density test sites per test section (5,000 ft.) | One (1) stratified random core per 5,000 ft test section. | Observe one (1) control strip or test section that each QC Inspector performs | Select one (1) stratified random core per five (5) lots for density testing. A minimum of three (3) cores per project |
| In Place Pavement Density and Depth Checks by Cores (for all asphalt except Stone Matrix Asphalt (SMA)) (Asphalt Pavement) | | VTM-006; VTM-32 | Density – minimum of one (1) core per location not long enough to establish roller patten/control strip. Depth (per 24 ft width)- from 0 to ½ miles, two (2) cores; from ½ to ¾ miles, three (3) cores; from ¾ to 1 mile, Four (4) cores | Density - One (1) random core per 10 QC locations. Depth – one (1) core per two (2) miles per 24 ft width. | Select one (1) stratified random core per ten (10) lots. A minimum of one (1) per project | Select one (1) stratified random core per five (5) lots. A minimum of three (3) cores per project. The core for IV density testing may be used for this purpose |
| In Place Pavement Density and Depth by Cores for Stone Matrix Asphalt (SMA) | VDOT Section 317 | VTM-006 | Minimum of one (1) sample per 1000 feet with a maximum of five (5) samples per day/night’s production for density and depth. Three (3) cores for test strip. | Independently weigh and measure 1 QC core per day/night’s production (20% of the cores tested by QC). QA Contractor will observe the taking of these cores and will maintain control of these cores once obtained | Select one (1) stratified random core per ten (10) day/nights of production for density and depth. A minimum of one (1) per project | Select one (1) stratified random core per five (5) day/nights of production for density and depth. A minimum of three (3) per project |
| HYDRAULIC CEMENT CONCRETE PAVEMENT (HCC Pavement) | VDOT Section 217 | | | | | |
| Concrete Entrained Air Content (HCC Pavement) | | ASTM C231 | One (1) test per hour | 10% of QC frequency | First three (3) tests performed then 2% of QC frequency | 10% of IA frequency |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|---|------------------|------------------------|---|---|--|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Slump of Hydraulic Cement Concrete (HCC Pavement) | | ASTM C143 | One (1) test per hour | 10% of QC frequency | First three (3) tests performed then 2% of QC frequency | 10% of IA frequency |
| Temperature of Concrete (HCC Pavement) | | ASTM C 1064 | Test every load | 10% of QC frequency | First three (3) tests performed then 2% of QC frequency | 10% of IA frequency |
| Concrete Unit Weight | | ASTM C138 | One (1) test per hour | 10% of QC frequency | First three (3) tests performed then 2% of QC frequency | 10% of IA frequency |
| Compressive Strength of Concrete Cylinders (HCC Pavement) | | ASTM C31 | One (1) beam cast for every 100CY and at least one (1) for each days concreting operation | 10% of QC frequency | 10% of QC frequency | 10% of IA frequency |
| Concrete Reinforcing Steel (HCC Pavement) | | ASTM A615 | Verify manufacturers certificates for every shipment for acceptance prior to placement | One (1) sample per manufacture per most common size per structure | One (1) sample per project | One (1) sample per project |
| | | | | | | |
| HYDRAULIC CEMENT CONCRETE ITEMS (Miscellaneous Concrete) | VDOT Section 217 | | | | | |
| Concrete Entrained Air Content (Miscellaneous Concrete) | | ASTM C231 ASTM C173 | One (1) test per hour | One (1) test per day (10% of QC frequency) | One (1) per 10,000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) per 100,000 CY, minimally one (1) per year per project. Performed by Project Staff. |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|---|---------------|----------------------|--|--|--|--|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Slump of Hydraulic Cement Concrete (Miscellaneous Concrete) | | ASTM C143 | One (1) test per hour | One (1) test per day (10% of QC frequency) | One (1) per 10,000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) per 100,000 CY, minimally one (1) per year per project. Performed by Project Staff. |
| Temperature of Concrete (Miscellaneous Concrete) | | ASTM C 1064 | One (1) test per hour | One (1) test per day (10% of QC frequency) | One (1) per 10,000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) per 100,000 CY, minimally one (1) per year per project. Performed by Project Staff. |
| Concrete Unit Weight | | ASTM C138 | One (1) test per hour | One (1) test per day (10% of QC frequency) | One (1) per 10,000 CY, minimally one (1) in first five (5) tests taken for QA. Performed by Project Staff. | One (1) per 100,000 CY, minimally one (1) per year per project. Performed by Project Staff. |
| Compressive Strength of Concrete Cylinders (Miscellaneous Concrete) | | ASTM C31 ASYM C39 | One (1) set of three (3) cylinders per every 250CY and at least one set per day | (10% of QC frequency) One (1) set of three (3) cylinders per every 2,500CY (cumulative) | One (1) set of three (3) cylinders per every 25,000CY (cumulative) Performed by Project Staff | One (1) set of three (3) cylinders per every 25,000CY (cumulative) Performed by Project Staff |
| Concrete Reinforcing Steel (Miscellaneous Concrete) | | ASTM A615 | Verify manufacturers certificates for every shipment for acceptance prior to placement | One (1) sample per manufacture per most common size per structure | One (1) sample per project | One (1) sample per project |
| | | | | | | |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Material Type | Spec. Section | Test Reference | Contractor | | Department | |
|--|---------------|----------------|---|---|---|---|
| | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| Marking and Bead Application Rate | | VTM 94 | Daily at start up with periodic checks every three (3) hours of operation | Randomly select ten (10) twenty- foot in place sections of markings per day: 1) Preformed tape review placement, straightness, day and night color and brightness. Inspect structure of tape to insure patterned waffles have not been damaged by roller. 2) Liquid materials (paint, thermoplastic and epoxy) review placement, measure width, observe even distribution and embedment of glass beads, observe color (night and day) and brightness/reflectivity, review application rates to insure proper thickness applied. | Review 10 % of the C85 daily reports to verify calculated quantities match the application rates and confirm that daily measurements were performed as described in VTM 94. Performed by Project staff. | Upon completion of pavement markings installation, perform two (2) IV tests, consisting of one (1) day and one (1) night time (examining the brightness and nighttime color while driving along Project) review of the marking installation. Performed by Traffic Engineering or Materials Division once the markings have all been placed. |
| | | | | | | |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

Table 105.4: Part 2 – Contractor Product Installation, Practices and Procedures Compliance Monitoring and Verification

| No. | Material Type/ Action | Spec. Section | Test Reference | Contractor | | VDOT | |
|-----|--|---|----------------|---|---|-----------------------------------|--------------------------------------|
| | | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| 1 | Clearing and Grubbing | VDOT Section 301 | Table A3 | | | | |
| | Ensure activities are confined to limits and seeded within 30 days of disturbance | | | Daily | Weekly | Monthly | Review documentation upon completion |
| 2 | Pre-cast Structures | VDOT Section 404 | | | | | |
| | Verify bedding material is installed properly and that pre-cast materials are not chipped or cracked | | | Daily | Once per structure or run of pipe | 10% of structures or runs of pipe | 10% of IA frequency |
| 3 | Erosion and Siltation Control | VDOT Section 303.03 & Current Virginia DCR Specifications | | | | | |
| | Monitor for correct installation and maintenance | | | Daily | Weekly | Weekly | Monthly inspection of documentation |
| 4 | Undercut | VDOT Section 303.04 | | | | | |
| | Review area to determine need for undercut | | | Prior to start of work at each location | All reports reviewed by QAM ; QAM to verify qualified inspector and correct equipment | 10% of QA frequency | Review documentation upon completion |

* Unless otherwise noted the Design-Builder’s QA testing frequency is relative to QC frequency and the Owner’s IA and IV frequencies are relative to the Design-Builder’s required QA frequencies. IA will be split samples and IV will be independent samples. QC will be performed in accordance with the requirements of Materials Manual of Instruction and Contract Specifications.

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| No. | Material Type/ Action | Spec. Section | Test Reference | Contractor | | VDOT | |
|----------|---|----------------------------|----------------|---|--|---------------------|--------------------------------------|
| | | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| | Measure undercut area | | | Prior to backfill at each location | All calculations/reports checked/reviewed by QAM to verify qualified inspector and correct equipment | 10% of QA frequency | Review documentation upon completion |
| 5 | Load Bearing Piles | VDOT Section 403 | Table A3 | | | | |
| | Monitor operation and document blow counts | | | Continuously | Daily | Weekly | Review documentation upon completion |
| | Perform Center of Gravity calculations | | | For each foundation | One (1) for every ten (1) foundations (10% of QC frequency)) | 10% of QA frequency | 10% of IA frequency |
| 6 | Structural Steel | VDOT Section 407 | Table A3 | | | | |
| | Check torque of bolts | | | 10% of bolts but not fewer than two (2) in any connection | Minimum one (1) bolt per connection (10% of QC frequency) | 10% of QA frequency | 10% of IA frequency |
| 7 | Protective Coating of Metal Structures | VDOT Section 411 SSPC-PA-2 | Table A3 | | | | |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| No. | Material Type/ Action | Spec. Section | Test Reference | Contractor | | VDOT | |
|-----------|--|------------------|----------------|--|--|-------------------------------------|--------------------------------------|
| | | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| | Monitor surface preparation and check coating thickness | | | Take three (3) surface profile measurements per day of blasting. Five (5) Spot measurements (15 individual readings) per day as defined in PA-2 for coating thickness after each layer of applied protective coating at each location. | (10% of QC frequency) Take two (2) surface profile measurements per week of blasting. One (1) Spot measurement (3 individual readings) per day as defined in PA-2 for coating thickness after each layer of applied protective coating at each location. | 10% of QA frequency | 10% of IA frequency |
| 8 | Underdrains | VDOT Section 501 | Table A3 | | | | |
| | Inspect to ensure no deficiencies per VTM 108 | | | All accessible outlet locations; Additionally a minimum of 10% of longitudinal sections | Observe 10% of outlet locations; Additionally a minimum of 1% of longitudinal sections | 10% of QA frequency | 10% of IA frequency |
| 9 | Guardrail | VDOT Section 505 | Table A3 | | | | |
| | Verify that guardrail is installed per specifications and at proper height | | | Daily | Spot-check every fifty (50) linear feet for proper height | 10% of QA frequency | 10% of IA frequency |
| 10 | Fencing | VDOT Section 507 | Table A3 | | | | |
| | Verify fencing type, height and location | | | Daily | Weekly | Field inspection with final payment | Review documentation upon completion |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| No. | Material Type/ Action | Spec. Section | Test Reference | Contractor | | VDOT | |
|-----------|---|-----------------------|----------------|----------------------|---|------------------------------|---|
| | | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| 11 | ROW Monuments | VDOT Section 503 | Table A3 | | | | |
| | Verify monument type and location | | | 10% of ROW monuments | 1% of ROW monuments (10% of QC frequency) | 10% of QA frequency | 10% of IA frequency |
| 12 | Maintenance of Traffic | VDOT Section 512 | Table A3 | | | | |
| | Monitor installation and maintenance and use Work Zone Safety Checklist | | | Daily | Weekly | Review documentation Monthly | Review documentation on each site visit |
| 13 | Sound Barrier Walls | VDOT Section 519 | Table A3 | | | | |
| | Verify location and installation with shop drawings | | | Daily | Weekly | Bi-Monthly | Review documentation upon completion |
| 14 | Topsoil and Seeding | VDOT Section 602/ 603 | Table A3 | | | | |
| | Verify proper material is utilized at application rates from plans | | | Daily | Weekly | Review final installation | Review documentation upon completion |
| 15 | Planting | VDOT Section 605 | Table A3 | | | | |
| | Verify that proper plants are installed at correct locations per plans | | | Daily | Weekly | Review final installation | Review documentation upon completion |
| | Monitor that plants are cared for during establishment period | | | Daily | Weekly | Monthly | Review documentation upon completion |

Appendix 1 Table 105.4 – Department’s Minimum Requirements for Design-Builder’s QA/QC Plans on Design-Build Projects
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| No. | Material Type/ Action | Spec. Section | Test Reference | Contractor | | VDOT | |
|-----------|---|------------------|----------------|---|---|--|--|
| | | | | QC Frequency | QA Frequency* | IA Frequency* | IV Frequency* |
| 16 | Traffic Signs | VDOT Section 512 | Table A3 | | | | |
| | Verify that signs meeting current standards are utilized in locations per plans | | | Daily | Weekly | Weekly | Review documentation upon completion |
| 17 | Traffic Signals | VDOT Section 703 | Table A3 | | | | |
| | Monitor installation for conformance with plans and specifications | | | Daily | Weekly | Weekly | Review documentation upon completion |
| 18 | Water and Sewer Facilities | VDOT Section 520 | Table A3 | | | | |
| | Monitor installation for conformance with plans and specifications. | | | Daily | Weekly | Weekly | Review documentation upon completion |
| 19 | Specialty Contract Items | | | | | | |
| | Various | Various | Various | Monitor at rates set forth in QA/QC plan. | Monitor at rates set forth in QA/QC plan. | 10% of QA frequency or as determined by VDOT Project Manager | 10% of IA frequency or as determined by VDOT Project Manager |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---|--|---|---|---|
| 1 Clearing and Grubbing (C&G) | VDOT Section 301 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor that the QAM is confining effort to C&G activities and to areas so designated for C&G within the plans and scheduled within the next 30 days. Areas not worked within 30 day period should be temporarily seeded. | Department’s IA – Monthly. | Physical field inspection performed with final payment. |
| | | Verify approval of design documents for locations of work to be performed. The QA and QC requirements as specified in the DB’s QA/QC Plan. | DB’s QC – Daily. DB’s QA – Weekly. | | |
| | | Identify items of work and the frequency of IA and IV Inspections. | | | |
| 2 Excavation and Backfill of Structures | VDOT Contract Special Provisions & Section 303/304 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify by observation or review of the QAM’s records, that each foundation has been probed or tested and has been accepted by the QAM. | On key structures identified by the Department’s Project Manager. | Review TL-124(s), to verify that the appropriate frequency of testing was performed during the operation. |
| | | Verify work related design documents have been approved. | Verify that proper lift depths and density tests are being performed as required. Review the completed TL-124(s) to verify that the appropriate frequency of testing was performed. | Weekly. | Physical field inspection performed with final payment. |
| | | Verify QA and QC requirements as specified in the DB’s approved QA/QC Plan. | Perform IV testing at a rate of one (1) for every ten (10) QC tests for density. | 10% of QA tests. | |
| 2 Excavation and Backfill of Structures | | Identify items of work and the frequency of IA and IV Inspections. | Perform IV testing at a rate of 1% for proctors. | 1% of proctors (no less than 1). | Physical field inspection performed with final payment. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---|--|---|---|---|
| (Cont) | | Verify backfill material has been approved and density requirements established. Changes in backfill material shall be similarly reviewed/approved. | Perform IA testing at a rate of one (1) IA density test for the first three (3) QC test performed by DB QC and QA personnel and then one (1) every fifty (50) QC density tests thereafter for the backfill of structures. | First three (3), then one (1) every fifty (50) there after. | |
| 3 Pipe Culverts, Storm Drains and Pre-cast Structures | VDOT Contract Special Provisions & Section 302/404 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify QA and QC personnel’s inspection of pipe culverts, storm drains and pre-cast structures to ensure that bedding material is properly placed and shaped. | Weekly. | Verify that all structures are accurately documented in the QA and QC personnel’s diaries |
| | | Check that design documents that relate to the work to be performed have been approved. | Verify that pipe is not damaged, joints are properly sealed and bell/spigot ends are at the proper orientation. | Weekly. | Physical field inspection performed with final payment |
| | | Verify QA and QC requirements as specified in the DB’s approved QA/QC Plan. | DB’s QC – Daily. DB’s QA – Once per structure or run of pipe. | Department’s IA confirm 10% of structures or runs of pipe. | Department IV 10% of IA frequency |
| | | Identify items of work and the frequency of IA and IV Inspections. | | | |
| | | Verify material to be used has been approved. | | | |
| | | Verify material to be used has been approved. | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|---|--|--|---|---|
| 4 Cast-In-Place Structures | VDOT Contract Special Provisions & Section 302 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify form work and rebar conforms to the plans and specifications and is free of debris. | Weekly. | Monitor curing based on the current and forecasted weather conditions. Control cylinders cast should be cured in the same manner as the in-place concrete. Physical field inspection performed with final payment. |
| | | Verify design documents that relate to the work to be performed have been approved. | Verify that two (2) Certified Concrete Field QC Inspectors are present during placement and that proper testing methods are being implemented. | Weekly. | |
| | | Verify QA/QC requirements as specified in the DB’s approved QA/QC Plan. | Verify that the proper frequency of testing and material samplings is performed by the QA and QC personnel. | Weekly. | |
| | | Review the items of work and the frequency of IA and IV Inspections. | Test results on the TL-28 Coding Form – Concrete Batch Report at the frequency previously approved. | Weekly. | |
| | | Verify by observation or review of QAM’s records, that each foundation has been probed or tested in another manner and accepted by the QAM. | Perform IV tests for consistency (slump) and air entrainment and take cylinders at a ratio of one (1) IV test for each ten (10) QC tests. | 10% of QAM tests. | |
| | | Verify hydraulic cement mix design has been approved. | Provide written notice of non-compliant materials to the DB’s QAM. | As required. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---|--|--|---|---|
| 4 Cast-In-Place Structures (Cont) | VDOT Contract Special Provisions & Section 302 | Review concrete strength requirements prior to the placement of superimposed concrete or backfill. | Perform IA testing at a rate of one (1) IA test for the first three (3) QC tests performed by QA and QC personnel and then one (1) every fifty (50) QC tests thereafter for consistency (slump), air entrainment, unit weight, temperature, strength (3 cylinders) and permeability. | First three (3) then one (1) every fifty (50) thereafter. | Physical field inspection performed with final payment. |
| 5 Erosion and Siltation Control | VDOT Sections 107.17(a) 303 DCR E&SC Hand-Book | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. Prior to start of any land disturbing activities, verify that all applicable permits are on file, as required, per contract documents. | Conduct weekly inspections of all Erosion and Sedimentation control, and as otherwise required by Specification 107.17(a). | Weekly. | Verify that temporary erosion and siltation control devices are removed at the completion of and prior to acceptance of the Project. Physical field inspection performed with final payment. |
| | | | Monitor the DB’s Erosion and Siltation Control devices for proper installation and maintenance. | Weekly. | |
| | | | Verify that proper incremental seeding is performed | Weekly. | |
| | | | Monitor DB’s completion of Form C-107 for proper completion and signatures of both the DB’s QAM and Construction Manager. | Monthly. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|-----------------------|---|--|---|--|---|
| 6. Embankments | VDOT Contract Special Provisions, Density control of Embankments and Backfill (SP dated Nov 26, 2006 & Section 303 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify by observation or review of the QAM’s records that density testing was performed as required. | Weekly during fill operations. | Review the completed TL-124(s), Report of Nuclear Embankment Densities, to verify that the appropriate frequency of testing was performed during the operation. |
| | | Verify design documents that relate to the work to be performed have been approved. | Visually observe the placement of embankment material and monitor that proper nuclear density testing of the material is being performed by the QA and QC personnel. Provide written notice of discrepancies to DB’s QAM. | Weekly during fill operations. | Monthly or at conclusion of (Work Package) Operation. |
| | | Verify the QA and QC requirements as specified in the DB’s QA/QC Plan. | Review the completed TL-124(s), Report of Nuclear Embankment Densities, to verify that the appropriate frequency of testing was performed during the operation. | Weekly during fill operations. | Monthly or at conclusion of (Work Package) Operation. |
| | | Verify the items of work and the frequency of IA and IV Inspections. | Monitor that the QA and QC Inspectors utilize a nuclear density gauge, which had been calibrated within the previous 24 months by an approved calibration service. | Bi-Monthly. | |
| | | Verify embankment fill material has been approved and density requirements have been established. | Perform IV testing at a rate of one (1) IV density test for every ten (10) QC density tests for the placement of embankment material. | IA at 10% of QA frequency. IV at 10% of IA frequency. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|------------------------------|---|--|--|--|---|
| 6. Embankments (Cont) | VDOT Contract Special Provisions & Section 303 | Verify approval and density requirements for any backfill material changes during the operations. | Perform IV testing at a rate of one (1) IV proctors for every ten (10) QC proctors of embankment material. | IA at 10% of QA frequency. IV at 10% of IA frequency. | Monthly or at conclusion of (Work Package) Operation. |
| | | | Perform IA testing at a rate of one (1) IA density test for the first three (3) QC tests performed by DB QC and QA personnel and then one (1) every fifty (50) QC density tests thereafter for the placement of embankment material. | First three (3) then one (1) every fifty (50) thereafter. | |
| 7 Undercut Excavation | VDOT Contract Special Provisions & Section 303 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | If undercut excavation is part of a claim of differing site conditions continuously monitor and document the location, conditions, equipment used, personnel used and hours worked for undercut operation. Upon completion of the excavation, verify the quantity of material removed. | Continuously. | Review the completed TL-124(s), Report of Nuclear Embankment Densities, to verify that the appropriate frequency of testing was performed during the operation. |
| | | | If the undercut excavation is claimed as a differing site condition, review the area and document the condition prior to start of work. | Intermittently monitor the operation. Review the QAM’s daily records for any undercut operations to ensure that they adequately document the location, conditions, equipment used, personnel used and hours worked for the undercut excavation and backfill. | Weekly. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|-------------------------------------|---|--|--|---|---|
| 7 Undercut Excavation (Cont) | VDOT Contract Special Provisions & Section 303 | If the undercut excavation is claimed as a differing site condition, review the area and document the condition prior to start of work. | Monitor that nuclear density tests are performed by the DB’s QA and QC personnel in accordance with the Embankment Fill procedures. | Weekly. | Review the completed TL-124(s), Report of Nuclear Embankment Densities, to verify that the appropriate frequency of testing was performed during the operation. |
| 8 Aggregate Base Material | VDOT Section 304/305/308/309 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify that sub-grade has been accepted by the QAM. Monitor that the sub-grade material has been graded to proper tolerances and properly scarified. | Prior to first placement (per location). Weekly (for tolerances and scarification). | Review 10% of the completed nuclear density test reports during the operation. |
| | | Verify design documents that relate to the work to be performed have been approved. | Verify that each lift has been accepted by the QAM. | Weekly. | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Intermittently observe the placement of aggregate base material and monitor that proper nuclear density testing of the material is being performed by the QA and QC personnel. | Weekly. | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | Monitor each Control Strip and Test Section for compliance with approved procedures. | Observe the first control strip and test section that each QA and QC personnel member on the Project performs. Spot check thereafter. | |
| | | Verify the material to be used has been approved. | Review 10% of the completed nuclear density test reports, to verify appropriate frequency of testing was performed during the operation. | Weekly. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|--|--|---|--|--|
| 8 Aggregate Base Material (Cont) | VDOT Section 304/305/308/309 | Verify the material to be used has been approved. | Perform IV testing at a rate of one (1) IV density test for every ten (10) QC density tests during placement. | 10% of QAM tests. | Physical field inspection performed with final payment. |
| | | | Perform IA testing at a rate of one (1) IA density test for the first three (3) QC tests performed by DB QC and QA personnel and then one (1) every fifty (50) QC density tests thereafter for the placement of aggregate base material. | First three (3) then one (1) every fifty (50) thereafter. | |
| 9 Cement Treated Aggregate Base Material | VDOT Section 304/305/307/308 /309 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify that sub-grade has been accepted by the QAM. Monitor that the sub-grade material has been graded to proper tolerances and properly scarified. | Prior to first placement (per location). Weekly (for tolerances and scarification). | Review 10% of the completed nuclear density test reports during the operation. |
| | | Verify design documents that relate to the work to be performed have been approved. | Verify that each lift has been accepted by the QAM. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Intermittently observe the placement of cement treated aggregate base material to monitor that compacting and finishing operations are within specified time limits and allowable moisture content range as well as monitoring that the curing procedures are being followed. Also monitor that proper nuclear density testing of the material is being performed by the QA and QC personnel. | Weekly. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|--|--|---|---|--|
| 9 Cement Treated Aggregate Base Material (Cont) | VDOT Section 304/305/307/308 /309 | Review the items of work and the required frequency of IA and IV Inspections. | Monitor each Control Strip and Test Section for compliance with approved procedures. | Observe the first control strip and test section that each QA and QC personnel member on the Project performs. Spot check thereafter. | Physical field inspection performed with final payment. |
| | | Verify the material to be used has been approved. | Review 10% of the completed nuclear density test reports, to verify appropriate frequency of testing was performed during the operation. Perform IA testing at a rate of one (1) IA density test for the first three (3) QC tests performed by DB QC and QA personnel and then one (1) every fifty (50) QC density tests thereafter for the placement of aggregate base material | Weekly. First three (3) then one (1) every fifty (50) there after. | |
| | | | | | |
| 10 Soil Stabilization – Lime & Cement | VDOT Sections 304/305/306/307 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor that road bed has been graded to proper tolerances and properly scarified. Verify acceptance by the QAM after application of soil stabilization material. | Prior to the first placement of material in an area. | Monitor that the material is being properly cured on a weekly basis. |
| | | Verify design documents that relate to the work to be performed have been approved. | Perform check of tolerances, scarification and installed to the specified depth. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Review the completed nuclear density test reports. | Weekly. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|--|--|---|---|---|
| | | Review the items of work and the required frequency of IA and IV Inspections. | Monitor (visually) that the material is being properly cured or by review of the QA and QC documentation. | Weekly. | |
| | | Review application rate calculations. | Monitor that the QA and QC Inspectors utilize a nuclear density gauge, which has been calibrated within the previous 24 months by an approved calibration service. | Bi-Monthly. | |
| | | | | | |
| 11 Stabilized Open-Graded Material | VDOT Sections 304/305/307 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify through direct observation or review of QAM documents that the material has been accepted by the QAM after placement. | Weekly. | Verify material has been accepted by the QAM after placement. |
| | | Verify design documents that relate to the work to be performed have been approved. | During placement of hydraulic cement concrete, verify that two (2) Certified Concrete Field Inspectors are present. During placement of asphalt pavement, verify that one (1) Certified Asphalt Technician is present during pavement operations, each site. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify material proposed for use has been approved. | | | |
| | | | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|---------------------------------|--|---|---|--|
| 12 Asphalt Surface Treatment | VDOT Section 313 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor and verify that one (1) Certified Asphalt Field QC Inspector is present during the entire operation. | Weekly. | Verify that the each section of asphalt surface treatment has been accepted by the QAM. The QAM’s records should indicate proper rate of application of liquid asphalt and cover material. |
| | | Verify design documents that relate to the work to be performed have been approved. | Verify that the each section of asphalt surface treatment has been accepted by the QAM. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | The QAM records should indicate the proper rate of application of liquid asphalt and cover material. | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify materials proposed for use has been approved. | | | |
| | | | | | |
| 13 Asphalt Concrete Pavement | VDOT Section 315/515 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Review the sub-base for conformity with the requirements of the contract and proper surface grading of the material. If the sub-base is an existing surface which required pavement planning, visually verify proper depth of planing. | Per each mobilization of paving crew. | Verify, either through direct observation or through review of the QAM’s records, that each lift has been accepted by the QAM. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|-----------------------------|---|--|--|---|
| 13 Asphalt Concrete Pavement (Cont). | VDOT Section 315/515 | Verify design documents that relate to the work to be performed have been approved. | Verify that two (2) Certified Asphalt Field QC Inspectors are present during the entire placement and that proper testing methods are being implemented. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan | Verify, either through direct observation or through review of the QAM’s records, that each lift is being accepted by the QAM. | Weekly. | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | Intermittently observe the placement of asphalt concrete material and monitor that proper nuclear density testing of the material is being performed by appropriate QA and QC personnel. Provide written notice of discrepancies to DB’s QAM. | Weekly. | |
| | | Verify the asphalt concrete mix design to be used has been approved. | Monitor the creation of each control strip and test section for compliance with approved procedures. | Observe the first control strip and test section that each QA and QC personnel member on the Project performs. | |
| | | | Review 10% of forms TL-56, 57, 58, and 59. | Monthly. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|-----------------------------|--|--|--|---|
| 13 Asphalt Concrete Pavement (Cont). | VDOT Section 315/515 | Review the sub-base for conformity with the requirements of the contract and proper surface grading of the material. If the sub-base is an existing surface which required pavement planning, visually verify proper depth of planning. | Review 10% of the completed nuclear density test reports to verify that the appropriate frequency of testing was performed during the operation. | Weekly. | Physical field inspection performed with final payment. |
| | | | Monitor that the QA and QC Inspectors utilize a calibrated nuclear density gauge. | Bi-Monthly. | |
| | | | Perform IV testing by taking cores at a rate of one (1) IV density test for every ten (10) QC density tests | 10% of QAM tests. | |
| | | | Perform Independent Assurance testing at a rate of one (1) IA test for the first three (3) QC tests performed and then one (1) every fifty (50) QC tests thereafter for consistency (slump), air entrainment, unit weight, temperature, strength (3 cylinders) and permeability. | First three (3) then one (1) every fifty (50) tests there after. | |
| | | | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---------------------------------|--|--|---|---|
| 14 Hydraulic Cement Concrete Pavement | VDOT Section 217/316/515 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Visually review the sub-base for general conformity with the requirements of the contract and proper surface grading of the material. If the sub-base is an existing surface which required pavement planing, visually check for proper depth of planing. | Per each section of concrete pavement. | Verify, either through direct observation or through review of the QAM’s records, that each section has been accepted by the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | Monitor the QA/QC operations and verify that two (2) Certified Concrete Field QC Inspectors are present during the entire placement and that proper testing methods are being implemented. | Weekly. | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders and flexural beams cast should be cured in the same manner as the in-place concrete. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Verify that the proper frequency of testing and material samplings is performed by the QA and QC personnel. Monitor the installation of joint reinforcement material | Weekly. | Physical field inspection performed with final payment. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|--|--|--|--|--|
| 14 Hydraulic Cement Concrete Pavement (Cont) | VDOT Section 217/316/515 | Review the items of work and the required frequency of IA and IV Inspections. | Perform Owner Independent Verification (IV) tests for consistency (slump), temp, weight, chloride permeability and air entrainment and take cylinders at a ratio of one (1) IV test for each ten (10) QC Tests. Record the results of the IV tests on a TL-28. | Weekly. | Physical field inspection performed with final payment. |
| | | | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders and flexural beams cast should be cured in the same manner as the in-place concrete. | Weekly. | |
| | | | Perform IA testing at a rate of one (1) IA test for the first three (3) QC tests performed and then one (1) every fifty (50) QC tests thereafter for consistency (slump), air entrainment, unit weight, temperature, strength (3 cylinders) and permeability. | First three (3) then 2% of QC frequency there after. | |
| | | | | IV performed at 10% of IA frequency. | |
| 15 Load Bearing Piles | VDOT Section 403 & 2005 Construction Manual | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify by observation or review of the QAM’s records, that each pile foundation has been accepted by the QAM. | 10% of the foundations on the Project. | Review the completed pile driving records and center of gravity calculations to verify that the appropriate QA and QC monitoring was performed during the operation. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|--|---|--|---|---|
| 15 Load Bearing Piles (Cont) | VDOT Section 403 & 2005 Construction Manual | Verify design documents that relate to the work to be performed have been approved. | Monitor the pile driving operation and verify that one (1) QC Inspector is present while piles are driven and results are documented for each pile. | Weekly. | Review the completed pile driving records and center of gravity calculations to verify that the appropriate QA and QC monitoring was performed during the operation. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| | | Verify the equipment to be used has been approved. | | | |
| | | The IA and IV personnel shall verify, either through direct observation or through review of the QAM’s records, that each pile foundation has been accepted by the QAM. | | | |
| 16 Bridge Hydraulic Cement Concrete Operations | VDOT Section 217/404/406/412 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify formwork and rebar conforms to the plans and specifications and is free of debris. Observe the screed dry run for bridge decks and bring deficiencies to the attention of the QAM. | 10% of concrete placements. | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders should be cured in the same manner as the in-place concrete. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---|---|--|---|---|
| 16 Bridge Hydraulic Cement Concrete Operations (Cont) | VDOT Section 217/404/406/412 | Verify design documents that relate to the work to be performed have been approved. | Monitor the QA and QC operations and verify that two (2) Concrete Field Certified QC Inspectors are present during the entire placement and that proper testing methods are being implemented. Verify that the proper frequency of testing and material samplings is performed by appropriate QA and QC personnel. | Weekly or continuously for bridge decks. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Perform Department’s IV tests for consistency (slump) and air entrainment and take cylinders at a ratio of one (1) Department’s IV test for each ten (10) QA/QC Tests. Department’s Project Manager shall record the results of the Department’s IV tests on a TL-28. | 10% of QAM tests. | |
| | | Review the items of work and the frequency of IA and IV Inspections. | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders cast should be cured in the same manner as the in-place concrete. | Weekly. | |
| | | Verify the material to be used has been approved. | Perform IA testing at a rate of one (1) IA test for the first three (3) QC tests performed and then one (1) every fifty (50) QC tests thereafter for consistency (slump), air entrainment, unit weight, temperature, strength (3 cylinders) and permeability. | First three (3) then 2% of QC frequency thereafter. | |
| | | Verify the equipment to be used has been approved. | | IV performed at 10% of IA frequency. | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|--------------------------------------|--|---|---|--|
| 17 Hydraulic Cement Concrete Items | VDOT Sections 217/404/412/502 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Greater than 25 cubic yards – monitor the QA and QC operations and verify that two (2) Certified Concrete Field QC Inspectors are present during the entire placement and that proper testing methods are being implemented. Incidental concrete placements less than 25 cubic yards – monitor the QA and QC operations and verify that one (1) Certified Concrete Field QC Inspector is present during placement activity placement and that proper testing methods are being implemented. Verify that the proper frequency of testing and material samplings is performed by the QA and QC personnel. | Weekly. | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders cast should be cured in the same manner as the in-place concrete. |
| | | Verify design documents that relate to the work to be performed have been approved. | Perform IV tests for consistency (slump) and air entrainment and take cylinders at a ratio of one (1) IV test for each ten (10) QC tests. Provide written notice of non-compliant materials to the DB’s QAM. | 10% of QAM tests. | Physical field inspection performed with final payment. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|--------------------------------------|--|---|--|---|
| 17 Hydraulic Cement Concrete Items (Cont) | VDOT Sections 217/404/412/502 | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Monitor that the in-place concrete is properly cured based on the current and forecasted weather conditions. Control cylinders cast should be cured in the same manner as the in-place concrete. | Weekly. | Physical field inspection performed with final payment. |
| | | Review the items of work and the required frequency of IA and IV Inspections. Verify the hydraulic cement concrete mix design to be used has been approved. | Perform IA testing at a rate of one (1) IA test for the first three (3) QC tests performed and then one (1) every fifty (50) QC tests thereafter for consistency (slump), air entrainment, unit weight, temperature, strength (3 cylinders) and permeability. | First three (3) then 2% of QC frequency there after. IV performed at 10% of IA frequency. | |
| 18 Structural Steel | VDOT Section 407 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify by observation or review of the QAM’s records, that the structure has been accepted by the QAM. | 10% of the structures on the Project. | Verify, either through direct observation or through review of the QAM’s records, that each structure has been accepted by the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | Monitor structural steel erection operations and observe the QC Inspections of weld quality and bolt torque. Directly observe the QC inspections of weld quality and bolt torque. | Weekly; but no less than once (1) per span. | Physical field inspection performed with final payment. |
| | | Review the shop drawings and/or erection drawings and verify they have been approved. | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|---|---|--|--|---|---|
| 18 Structural Steel (Cont) | VDOT Section 407 | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | Monitor structural steel erection operations and observe the QC Inspections of weld quality and bolt torque. | Weekly; but no less than once per span. | Physical field inspection performed with final payment. |
| | | Review the items of work and the required frequency of IA and IV Inspections. | Directly observe the QC inspections of weld quality and bolt torque. | | |
| | | Verify the material to be used has been approved. | | | |
| 19 Protective Coating of Metal in Structures | VDOT Section 411 SSPC-PA-2 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor the surface preparation of the structure prior to application of protective coatings and during the coating operation to verify that proper QA and QC Inspection procedures are followed. | Weekly. | Spot check coating thickness (3 individual readings) on the structure at a rate determined by the IA and IV requirements but no less than once per structure. |
| | | Verify design documents that relate to the work to be performed have been approved. | Take one (1) surface profile measurements per two (2) weeks of blasting. One (1) Spot measurement (3 individual readings) per day as defined in PA-2 for coating thickness after each layer of applied protective coating, minimum one (1) per structure, each location. | | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| | | | | | Physical field inspection performed with final payment. |
| 20. Underdrains | VDOT Section 501/VTM 108 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Check cut areas for springs and seepage after heavy rains and require investigation by designer if problems are found. | Per each heavy rainfall event. | Verify that QAM has checked pipe outlets to ensure they are not been crushed or displaced during construction. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|-------------------------------|-------------------------|--|---|---|---|
| 20. Underdrains (Cont) | VDOT Section 501 | Verify design documents that relate to the work to be performed have been approved. | Check cut areas for springs and seepage after heavy rains and require investigation by designer if problems are found. Observe 10% of outlet locations and a minimum of 1% of longitudinal locations. | Per each heavy rainfall event. Weekly | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Verify the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| 21 Guardrail | VDOT Section 505 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify that the operation is monitored by a QC Inspector with at current GRIT certification. | Daily | Review the installation and report noted deficiencies to the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | Verify that the operation is monitored by a QC Inspector with at current GRIT certification. | Daily | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
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Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|-----------------------------|--|--------------------------|---|---|
| 22 Fencing | VDOT Section 507 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | N/A | N/A | Review the final installation and document that installation and material type is acceptable; report noted deficiencies to the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | N/A | N/A | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| | | | | | |
| 23 Right-of-Way Monuments | VDOT Section 503 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | N/A | N/A | Review the final installation and document that installation and material type is acceptable; report noted deficiencies to the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | N/A | N/A | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---------------------------------|--|--|---|---|
| 23 Right-of-Way Monuments | VDOT Section 503 | Review the items of work and the required frequency of IA and IV Inspections. | N/A | N/A | Physical field inspection performed with final payment. |
| | | Review the material to be used has been approved. | | | |
| 24. Maintenance of Traffic | VDOT Section 512 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor that Flaggers are certified and properly attired. | Daily. | Review the site to make sure that signs are removed after completion of the operation. |
| | | | Review the weekly Work Zone Safety Checklists completed by the QA and QC personnel for completeness and accuracy. | Monthly. | Physical field inspection performed with final payment. |
| 25 Pavement Marking | VDOT Section 700/704 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | During Operations, verify that one (1) Certified Pavement Marking Technician is present and observing application thickness and bead rate testing. | Daily. | Review the completed installation for uniformity and conformance with the requirements of the specifications. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| 25 Pavement Marking (Cont)) | VDOT Section 700/704 | Review the items of work and the required frequency of IA and IV Inspections. | During Operations, verify that one (1) Certified Pavement Marking Technician is present and observing application thickness and bead rate testing. | Daily | Physical field inspection performed with final payment. |
| | | Verify the material to be used has been approved. | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|-----------------------------------|----------------------------------|--|--|---|---|
| 26 Sound Barrier Walls | VDOT Section 519 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | N/A | N/A | Review the final installation and document that installation and material type is acceptable; report noted deficiencies to the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | N/A | N/A | Physical field inspection performed with final payment. |
| | | Review shop drawings and verify they have been approved. | | | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| 27 Topsoil and Seeding | VDOT Sections 602/603 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | N/A | N/A | Review the final installation and report noted deficiencies to the QAM. Inspect for proper growth establishment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | Physical field inspection performed with final payment. |
| | | Review the items of work and the required frequency of IA and IV Inspections. | Verify that proper material is utilized at application rates from plans. | Once during operations | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|--------------------------------------|--|--|---|---|
| 27 Topsoil and Seeding (Cont) | VDOT Sections 602/603 | Verify the material to be used has been approved. | N/A | N/A | Physical field inspection performed with final payment. |
| 28 Planting | VDOT Section 605 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor that plants are properly cared for during the establishment period. | Monthly. | Inspect for damaged plantings and report noted deficiencies to the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| 29 Traffic Signs | VDOT Section 700/701 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Verify that all messages and symbols are correct and conform to the requirements of the MUTCD and sign stands are properly rated and stamped as such according to the contract (i.e. NCHRP 350). | Weekly. | Inspect traffic signs prior to ensure that the finished sign panels are free from cracks, gaps, streaks, wrinkles, blisters, discoloration, buckles and warps and have a smooth surface of uniform color. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | Physical field inspection performed with final payment. |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|---------------------------------|--|--|---|--|
| 29 Traffic Signs (Cont) | VDOT Section 700/701 | Review shop drawings and verify they have been approved. | Verify that all messages and symbols are correct and conform to the requirements of the MUTCD and sign stands are properly rated and stamped as such according to the contract (i.e. NCHRP 350). | Weekly. | Physical field inspection performed with final payment. |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| 30 Traffic Signals | VDOT Section 700/703 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor the installation of traffic loop detectors for proper installation procedures. | Weekly. | Verify that all traffic signals are functioning properly and that the DB’s furnished instructions for installing and maintaining the equipment and that the condition of the material is acceptable. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | |
| | | Review shop drawings and verify they have been approved. | | | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| | | Physical field inspection performed with final payment. | | | |

Table 105.5 – Design-Builder’s Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
 Minimum Requirements for Quality Assurance and Quality Control on Design-Build Projects
 August 2007

| Item of Work | Spec Reference | Preparatory Inspection | Intermediate Inspections | Minimum Frequency of Intermediate Inspections | Completion Inspection |
|--|-----------------------------|--|---|---|---|
| 31 Water and Sewer Facilities | VDOT Section 313 | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor pipe installation including bedding material and joint connections. | Weekly. | Verify, that each line has been disinfected, if required, tested for leaks and accepted by the QAM. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | Physical field inspection performed with final payment. |
| | | Review shop drawings and verify they have been approved. | | | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections. | | | |
| | | Verify the material to be used has been approved. | | | |
| 32 Specialty Contract Items | N/A | DB’s QAM to schedule and conduct preparatory inspection meeting (hold point) to review work prior to beginning construction activity on feature of Work. | Monitor installation of work, as agreed. | Weekly. | Physical field inspection performed with final payment. |
| | | Verify design documents that relate to the work to be performed have been approved. | | | |
| | | Review the QA and QC requirements as specified in the DB’s QA/QC Plan. | | | |
| | | Review the items of work and the required frequency of IA and IV Inspections and testing requirements identified. | | | |

Virginia Department of Transportation
Appendix 2 - Table 105-5
Design-Builder's Minimum Requirements for Inspection, Sampling and Testing of Definable Features of Work
August 20, 2007

PUBLICATIONS

Publications are available from the residency and district offices. All inspection personnel should have available the following items:

1. *Road and Bridge Specifications* book.
2. *Road and Bridge Standards, Volumes I and II.*
3. *2005 Construction Manual.*
4. *Inspection Manual*
5. *Manual of Instruction, Materials Division.*
6. *Work Area Protection Manual.*
7. *Erosion and Sedimentation Control Handbook.*
8. *Guard Rail Installation Training Manual.*
9. Current Instructional Memorandum.
10. *Post-Construction Manual*
11. *Survey Manual*

WEB SITES

The following web sites are available to assist in the performance of Inspection duties:

1. <http://virginiadot.org/business/const/default.asp>
2. <http://coweb/MaterialsNet/>
3. http://coweb/construction/saap_Manual/INSPECTION_MANUAL_DEC2001.PDF
4. <http://www.virginiadot.org/business/const/resources/2005%20Construction%20Manual.pdf>