ROANOKE COUNTY

Purchasing Division
5204 Bernard Drive, Suite 300-F, P.O. Box 29800
Roanoke, Virginia 24018-0798
TEL: (540) 772-2061 FAX: (540) 772-2074

July 29, 2022
ADDENDUM NO. 2 TO ALL BIDDERS

Reference: IFB 2023-002
Description: East Roanoke River Greenway, Phase 1
VDOT Project No. EN08-080-105, P101, R201, C501
VDOT UPC # 91191

Issue Date: June 27, 2022
Proposal Due: August 9, 2022

The above Project is hereby updated as addressed below:

1. Draft QAP: Please see attached as Exhibit 1 to this Addendum, a draft Quality Assurance Plan for bidders' reference.

Note: A signed acknowledgment of this addendum must be received at the location indicated on the original solicitation either prior to the proposal due date or attached to your proposal. Signature on this addendum does not substitute for your signature on the original proposal/bid document. The original proposal/bid document must be signed.

Thank you,

Kate Hoyt
Phone: (540) 283-8149
KHoyt@roanokecountyva.gov

Sign Name:	Print Name:
Name of Firm:	Date:

Construction Quality Assurance Plan (CQAP) for

Eastern Roanoke River Greenway, Phase I Project
Roanoke County, VA

July 27, 2022

LAP Construction Quality Assurance Plan (CQAP)

Eastern Roanoke River Greenway, Phase I Project

State Project # EN08-080-105, P101, R201, C501

Federal Project # TEA-5128(477)

UPC#91191

From: Proposed Cul-de-sac near Niagra Dam

To: Approximately 0.35 Mile South to Proposed Highland Road Trailhead

Roanoke County, VA

Project Description

This project consists of new construction of greenway trail beginning near Niagra Dam with a cul-de-sac and traveling south toward Highland Road to the proposed trailhead including upgrades to the existing entrance off of Highland Road to new 12-space parking lot. This project will entail erosion and sediment control, clearing and grubbing, earthwork and grading, placement of storm sewer structures and pipe, construction of trailbed and asphalt paving, fencing, and timber guardrail installation. Entrance road will require grading, subbase aggregate placement, new asphalt paving, pavement marking, signage, and wheel stops.

I. Date of Original CQAP Submittal: Draft attached to Addendum #2

II. CQAP Revision Date (if applicable):

III. Locality Name and Physical Address:

Roanoke County
5204 Bernard Drive
P.O. Box 29800

Construction Quality Assurance Plan (CQAP) for

Eastern Roanoke River Greenway, Phase I Project
Roanoke County, VA

July 27, 2022

Roanoke, VA 24018
Attn. David M. Henderson, PE

IV. Roanoke County Project Management Team:

David M. Henderson, PE

Responsible Charge Person:
Printed Name: David M Henderson, PE
Signature of Responsible Charge Person: _____
Contact Information: DHENDERSON@roanokecountyva.gov
Phone number: 540-772-2083

Engineer of Record (EOR):
Printed Name: J. Michael Johnson, PE
Signature of EOR: _____
Contact Information: mjohnson@handp.com
Phone number: (540)552-5592

CEI Project Manager/Contact for CQAP:
Printed Name of PM/CQAP Contact Person: Cody Bain
Signature of Contact Person: _____
Contact Information: cbain@mbpce.com
Phone number: 540-580-6077

QA Testing & Laboratory:
ECS Mid-Atlantic, LLC
7670 Enon Drive, Suite 101
Roanoke, VA 24019

In-Plan Utility Owner(s) – TBD

Construction Quality Assurance Plan (CQAP) for

Eastern Roanoke River Greenway, Phase I Project
Roanoke County, VA

July 27, 2022

V. Contractor's name and address:

TBD

Project Manager (PM):

TBD

Superintendent:

TBD

QC Testing & Laboratory:

TBD

VI. Organizational Chart:

a. See Appendix A

Construction Quality Assurance Plan (CQAP) for

Eastern Roanoke River Greenway, Phase I Project
Roanoke County, VA

July 27, 2022

Table of Contents

Eastern Roanoke River Greenway, Phase I Project
Roanoke County, VA

July 27, 2022

Construction Quality Assurance Plan (CQAP) Narrative

I. Mission Statement

This Construction Quality Assurance Plan (CQAP) identifies the guidelines under which the QC/QA staff(s) will perform their respective roles and responsibilities.

The contractor's QC staff will consist of VDOT certified technicians employed by TBD. Technicians from TBD will be performing both onsite and laboratory QC materials testing in accordance with the guidelines set forth in Chapter 13 of the LAP Manual.

The QA staff will consist of VDOT certified personnel from MBP/ECS. MBP/ECS will perform QA materials testing as required by the County, and in compliance with the current VDOT LAP Manual, Chapter 13 (Ref. Appendix C), to ensure Contractor QC tests are performed in compliance with the applicable test methods and specifications and are representative of the quality of the on-site product.

Independent Assurance (IA) and Verification Sampling and Testing (VST) will be performed as required for a federal and state funded, county maintained projects. IA inspections/testing shall be performed by either MBP or ECS and the technician and equipment shall be independent of the QA Testing personnel and equipment. It is expected that the Salem District Materials Lab will assist with this requirement to break compressive strength cylinders.

All materials shall be approved, sampled, and/or tested in conformance with contract specifications and the current version of the VDOT Locally Administered Projects Manual (LAP MANUAL).

The contractor will ultimately be responsible for the quality of the construction, *including the performance of QC testing as required in Chapter 13 of VDOT's current LAP Manual (see Appendix C).* MBP will serve as the County's on-site representative

and assist in managing the Construction Quality program, including the performance of QA Testing. MBP will provide on-site Quality Assurance (QA) inspection services (CEI) to assess the effectiveness of the construction processes, means and methods relative to the contract terms and conditions, approved for construction plans, and applicable County and State standards and specifications. The QC and QA testing firms/agencies will perform testing in accordance with this Construction QA Plan which is based on VDOT's Local Assistance Program (LAP) Manual Chapter 13 Guidelines and provide feedback to the Project Manager (PM) and/or their on-site representative. MBP will assure that all necessary QA/QC inspections and testing of materials and in-place construction has been performed and adheres to the contract, and that all associated documentation is in hand and acceptable before any payment is recommended for approval.

Any deviation from this CQAP shall not occur without a revised submittal of this CQAP to the both the County Engineer and the Salem VDOT District LAP Project Coordinator (or designee) for his or her review and approval.

II. Personnel Certification and Licenses

Copies of Personnel Certifications and Licenses as required by the Contract and/or VDOT LAP Manual are available upon request and are kept on file readily available for review. All personnel performing materials testing shall have the necessary certifications and experience/expertise required by the contract documents and the most current version of the VDOT LAP MANUAL. No work shall be performed otherwise.

The MBP QA Staff will provide inspection and testing to assess construction processes relative to the applicable standards and specifications. The MBP QA staff will provide daily reports of contractor's activities, inspection findings, and all other pertinent information. The MBP QA staff will also review all pay applications provided by the contractor prior to payment and make recommendation to the County Engineer regarding payment.

The QC staff will be responsible for performing and reporting of all QC sampling, testing, visual inspections, certifications, and daily reports directly to the MBP QA Inspector.

The Engineer of Record's (EOR's) role is as defined in the scope of work of the Construction Administration Contract. Generally, the EOR will be consulted for all design related changes, questions, or RFIs applicable to the plans and the contract documents. They may also be consulted for Shop Drawing submittals as applicable.

The Responsible Charge/Owner's Representative for this project is J Michael Johnson, PE with Hurt and Proffit. Generally, the Responsible Charge individual will represent the Owner and approve work performed and recommend approval of changes to the contract. Payment applications will be approved by the Owner. The Contractor, EOR, Responsible Charge, and the QA Inspector will perform services for the Owner as defined in their respective agreements.

The Contractor's role is as defined in the contract with the County. Generally, as related to this plan, the contractor is responsible for all construction means and methods to ensure a quality finished product is achieved on time and within budget as practicable. He is also responsible for carrying out the project QC requirements as described herein, and in accordance the contract terms and conditions and with Chapter 13 of the most current version of the VDOT LAP Manual. With respect to this project, the respective VDOT LAP requirements that apply to *locally and state funded projects that are locally maintained.*

III. Independent Assurance (IA)

IA materials testing is required for this project in accordance with the chapter 13 of the LAP Manual. MBP will handle the coordination of this aspect of the CQAP.

IV. Communication Channels

Once construction starts, MBP will coordinate, as appropriate, with the Contractor regarding the inspection and testing frequencies outlined and/or referenced in the CQAP, ensuring that adequate inspection and testing resources are available to meet the scheduled construction activities. During the prosecution of LAP related construction activities, the MBP QA Inspector, TBD, will communicate daily with the Contractor and as needed with QC team to ensure adequate testing services are available. The QA Inspector's primary point of contact on site will be the Superintendent from TBD. MBP's PM, Cody Bain, will review/audit the project and project documentation routinely (no less than monthly) to assure the CQAP is being followed and required documentation is accurate and complete. Results of QA/QC laboratory testing may be submitted at a later date in conjunction with internal QA/QC reviews. Any unacceptable work identified by the QA/QC staff will be documented, brought to the contractor's attention, and in concert with the contractor's plan for corrective action, scheduled for correction, to include additional inspection and testing requirements as appropriate and/or necessary. In conjunction with the contractor's two-week look-ahead schedule, MBP will assure that upcoming work activities are inspected and tested in accordance with the approved CQAP.

Communications will be handled by the QA Staff via the following meetings:

1. Preparatory Inspection Meetings (PIMs): Inspection preparatory meetings will be held in advance of specific work activities such as: Earthwork, Subgrade preparation, Stone Placement, Concrete Placement, Asphalt Placement, Pavement Markings, and any other activities identified as needing preparatory meetings. Appropriate Contractor representatives (to include Prime and Subs as applicable), County, Designer, QC, and QA staff will be invited to attend these meetings. The meetings will serve to verify the process for submitting and approving documents, materials, and permits specific to the upcoming work packages. The QA and QC inspection and

testing requirements, as detailed in the approved CQAP, will be reviewed, and scheduled. Materials sampling and testing by the respective QC personnel will also be scheduled. This meeting will be scheduled by the QA staff in conjunction with the project schedule.

2. Monthly Progress Meetings: The Responsible Charge Representative and/or the CEI PM will lead the monthly progress meeting, to include the Counties Design Engineer (Hurt and Proffit), QC, QA, and the Prime Contractor's staff. VDOT may attend at their discretion.

At a minimum, the Contractor will provide two-week look ahead schedules as well as daily coordination with the MBP QA Inspector for advanced notice of inspection/testing. The MBP QA Inspector will oversee QC materials testing and provide QA inspection and testing as required.

V. Submittal Procedures

The QA CEI Project Manager, Cody Bain, will be responsible for initially reviewing, recommending for approval, and tracking all submittals regarding compliance with the contract requirements, to the best of his knowledge. The Counties Responsible Charge person is the ultimate approving authority on all submittals unless it is determined they require the Engineer of Record's (EOR's) review and approval. Once received from the Contractor, the QA Project Manager is responsible for timeliness and delivery of submittals to the appropriate authority for approval as necessary and will work directly with the QA Inspector to maintain a log of all submittals.

VI. Resolution Procedure

In inconsistencies, or ambiguities, but before the Responsible Charge has provided a written response, shall be performed at the Contractor's risk. The most stringent requirement will be considered the controlling requirement, in the event of unclear contract specifications, published guidelines, or disputes related to substandard

materials, the dispute will be resolved in the following manner: The Contractor shall immediately report to the Responsible Charge individual, in writing, all discrepancies, that it finds between the Contract Documents and site conditions and any inconsistencies or ambiguities in the Contract Documents (RFI's). The Responsible Charge shall promptly either correct such discrepancies, inconsistencies, or ambiguities in writing, or respond promptly detailing the course of action that will be implemented to bring the matter to resolution. Work performed by the Contractor after discovery of such discrepancies, but before the dispute is resolved, will be at the contractor risk to bring the work performed into compliance with the resolution at no expense to the owner.

VII. Progress Reports

Progress reports will be provided by MBP to Roanoke County on a monthly basis or as requested by the Responsible Charge.

VIII. Materials Acceptance Records and Test Data

Materials Acceptance Records and Test Data shall be maintained by the MBP QA inspector during the construction of the project and are to be always readily available for inspection by the Salem VDOT district's LAP Engineer, or designee. These records shall be kept by the County for a minimum of 5 years after project completion.

This section describes the responsibilities and requirements for the identification, preparation, and maintenance of records that furnish objective documented evidence of quality. The term "records," used throughout this section, refers to QC and QA records attesting to the achievement of the quality and technical requirements of the work generated during the various phases of project construction activities of the contractor and its subcontractors and suppliers. Quality records shall be available for review by the Owner and VDOT.

General

A quality record is defined as a completed document that furnishes objective evidence attesting to the quality of items and/or activities. Quality records shall be legible, identifiable, and retrievable. These records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, disposition, and department or organization responsibilities shall be in accordance with the contract documents and the appropriate rules and regulations contained therein, and the VDOT Construction Manual, where applicable.

Each of the QC/ QA inspectors and/or technicians shall summarize their daily inspections, tests, and material sampling activities in a daily report. The report will include a summary of the Contractor's daily construction activities. Supporting inspection data sheets will be attached to the daily report where needed. Copies of the inspector's records shall be provided to VDOT upon request. All reports will be completed and incorporated in the project records within 24 hours.

At a minimum, the construction QA Inspection report will include the following information:

- Work performed by the firm, subcontractor, or material supplier, identified by Work Package notation
- Weather conditions
- Inspections performed and their results
- Communications
- Type, location, and results of all tests performed
- Delays encountered
- Safety related problems and corrective action taken
- Non-conforming work and the corrective action taken
- Reports on any meetings held and their results
- Record of visitors to site
- Signature of inspector

MBP will be responsible for the creation and/or management of the following additional reports and logs:

- Project Daily Work Reports
- Test Reports (provided by Contractor QC & MBP/ECS QA inspector/ technicians)
- Nonconformance Log
- Punch List
- Preparatory Inspection Meeting Minutes
- Progress Meeting Minutes

The contractor will use the VDOT C-107 form to document erosion and sediment inspections.

The QA inspectors will refer to the following documents during inspection and testing:

- Most Current Version of the VDOT LAP Manual
- Eastern River Greenway, Phase I Project Manual
- Eastern River Greenway, Phase I Project Construction Plans
- VDOT Construction Resource Guidebook
- VDOT Construction Quality Improvement Program Checklists
- VDOT Construction Manual (2005 with 2008 amendments)
- VDOT Post Construction Manual (May 2011)
- VDOT Road and Bridge Standards, Vol. 1, and Vol. 2 (2016)
- VDOT Road and Bridge Specifications (2016)
- VDOT Survey Manual
- VDOT Manual of Instruction for Material Division
- VDOT Virginia Work Area Protection Manual (2011 Revision 2.1)

Control of Quality Records

MBP's Construction Manager verifies QA record accuracy and maintains copies of all quality-related documentation. These records will be stored in files maintained in the project document control files in the MBP Roanoke office. All original documents

pertaining to project information will be maintained in the project file in the MBP Roanoke office. A complete set of project records (paper copies and electronic copies) will be provided to the Owner at the completion of the project. These records will be made available to VDOT upon request.

IX. Materials Testing Methods and Frequencies

Field and/or laboratory sampling will be performed for each material type to ensure compliance with all applicable specifications. Work will be sampled so that it meets the current County Specifications, VDOT Road and Bridge Specifications, and be carried out in compliance with the most current VDOT LAP Manual (Chapter 13) requirements. In addition, any material that appears defective or inconsistent with similar material being produced will be sampled, unless such material is voluntarily removed and replaced or corrected. Samples will be taken in accordance with American Association of Highway and Transportation Officials (AASHTO) procedures or other acceptable procedures by personnel approved by VDOT.

To the extent practicable Contractor QC testing will be performed in the presence of the MBP QA Inspector. Field and laboratory testing will be performed for each material type that meets the frequencies outlined in the LAP Manual. Copies of all test results will be furnished to the QA Inspector as soon as possible after the test has been performed, recorded, and the results checked to ensure compliance with the appropriate testing guidelines. The requirements for furnishing test results do not include sample aging or curing time; therefore, reporting times will be extended accordingly. If necessary, proposals will be submitted in writing for approval to use alternate AASHTO or state-approved test methods.

Specific testing quantities and/or frequencies will be established by the QC/QA team in conjunction with the contractor's two-week look ahead schedule and before initiation of corresponding construction activities. At a minimum, the project schedule will be evaluated in 30-day increments to establish more finite testing

quantities applicable within that period, with two-week look ahead' s preferred. This will be discussed at inspection preparatory meetings specific to planned work activities and their corresponding testing and inspection requirements.

Laboratory materials sampling and testing to be performed by QA/QC will be performed by a laboratory that is either:

A. Accredited in the applicable AASHTO procedures by the AASHTO Accreditation Program, or
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, or
C. A laboratory approved by VDOT's Materials Division or other accreditation program meeting the requirements of R18.

All materials testing laboratories shall meet the requirements as outlined in the LAP MANUAL, Chapter 13.2 for "Qualified Laboratories". No work shall be authorized otherwise.

X. Right to Inspect

The "right to inspect" by the VDOT LAP Engineer or designee is agreed upon for any and all project items and recognized by submittal of this CQAP.

VDOT has the right to inspect the work, in accordance with the LAP Manual, as noted herein.

Potential HOLD POINTS:

- **Subgrade Approval:** Requires written approval of the QA Inspector prior to the placement of the aggregate base layer.
- **Aggregate Base Approval:** Requires written approval by the QA Inspector prior to the placement of asphalt concrete pavement layer(s).

- **Erosion & Sediment Controls and Stormwater Pollution Prevention:** Requires written approval by the QA Inspector and the Roanoke County E&S Inspector prior to installation and/or modification.
- **Permanent Pavement Markings and Markers:** Requires written approval by the QA Inspector prior to installation, following the placement of the asphalt concrete pavement surface layer.

XI. Non-compliance

Non-compliance to this CQAP shall be promptly reported through the established communications process outlined in this CQAP.

Throughout the course of a project, items may be identified that do not meet specifications. Most of these items are identified as they happen and consequently, are corrected immediately. There are two classifications of non-compliant work:

1. Level 1: Deficient work identified and corrected on the same day. The Inspector points out the deficiency to the Superintendent, who corrects it immediately. This issue is noted in the DWR by the Inspector. The Inspector notes what he found and what the Contractor did to correct the issue. The issue is closed.

2. Level 2: Deficient work identified and corrected at a later date. These are items that an inspector identifies in the field, notifies the Superintendent, the Superintendent agrees to fix the item, and the inspector notes in his DWR what the issue is, the corrective action agreed to, and the date it will be completed. The issue is then recorded in the project Issue Log so it can be tracked to ensure it is resolved. The Issue Log is reviewed by the QA team on a weekly basis to ensure that all items are corrected. The QA team performs re-inspection of the item prior to removing it from the Issue Log. All issues

must be corrected before the Contractor receives 100% payment for that item.

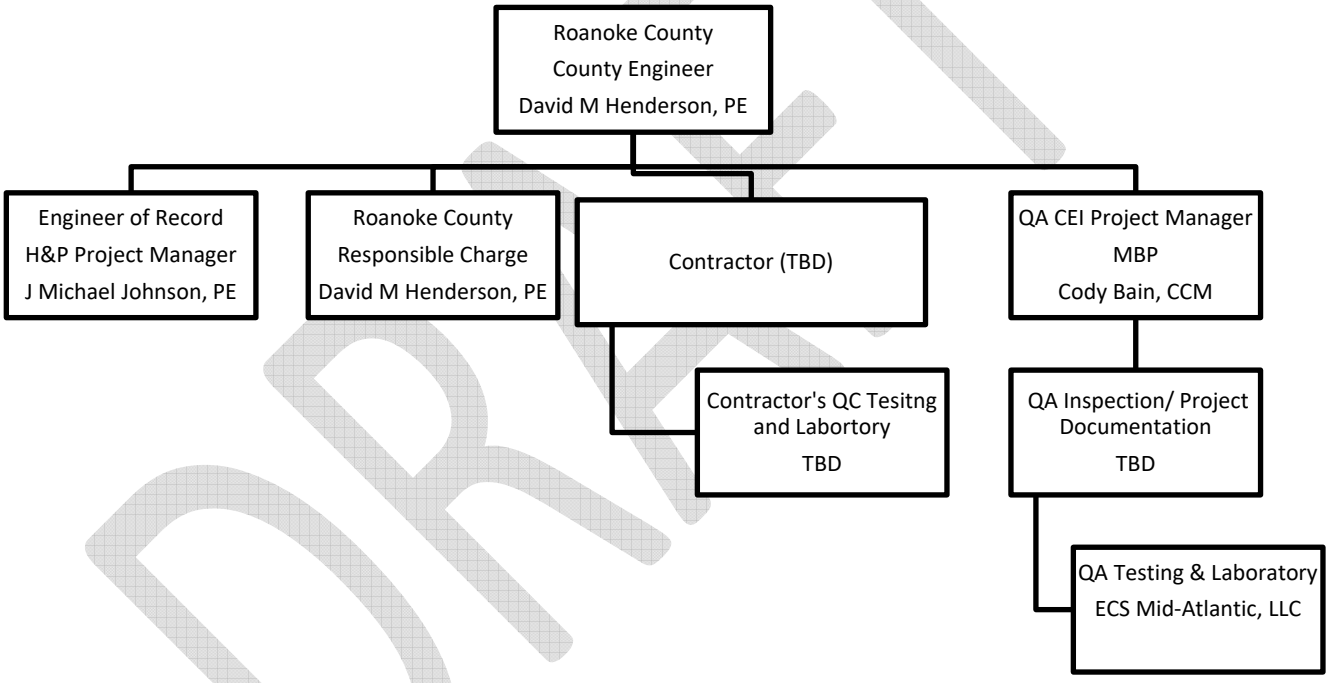
In the event of disputes, or noncompliant work that is not resolved by the contractor refer to Part V of this CQAP, and the applicable contract documents.

XII. Appendices

July 27, 2022

Appendix A – Organizational Chart

(TO BE COMPLETED AFTER CONTRACT AWARD)



Eastern Roanoke River Greenway, Phase I Project

Roanoke County, VA

July 27, 2022

Appendix B - Staff Qualifications Matrix

Inspector Name	Firm	Experience	Asphalt Concrete Field	ACI Concrete	Soils & Aggregate	Hazmat	Pavement Marking	GRIT	OSHA 10 or 30--HR	DEQ Dual Inspector	Flagger	Work Zone Training (Intermediate)
QA CEI Project Manager **Cody Bain, CCM**	MBP	11 yrs.	X	X	X	X	X	X	X	X	X	X
QA Inspector **(TBD)**	MBP	.	X	X	X	X	X	X	X	X	X	X
QA Testing Technician **(TBD)**	ECS			X	X	X						
Contractor QC Testing Technician **(TBD)**	TBD			X	X	X						
PAVING SUBCONTRACTOR **(TBD)**	TBD		X									
PAVEMENT MARKING SUBCONTRACTOR **(TBD)**	TBD						X					

Appendix C - LAP Manual Section 13.2 - G

LAP Construction Quality Assurance Plan (CQAP)

Eastern Roanoke River Greenway, Phase I Project

State Project # EN08-080-105, P101, R201, C501

Federal Project # TEA-5128(477)

UPC#91191

From: Proposed Cul-de-sac near Niagra Dam

To: Approximately 0.35 Mile South to Proposed Highland Road Trailhead

Roanoke County, VA

Shall use the Tables of Minimum Requirements for Quality Assurance and Quality Control on Design-Build and P3 Projects published in the latest Minimum Requirements for Quality Assurance and Quality Control on Design Build and Public-Private Transportation Act Projects.

Appendix 13.2– G

Materials Testing Methods and Frequencies

Locally Administered Projects using:

1. Design-Bid-Build model where the locality is providing:
    a. The inspection and testing staff
    b. Requesting VDOT to provide inspection and testing
    c. Hiring an Engineering consultant firm for inspection and testing*

        *The consultant must be independent from the contractor performing the construction work.

Shall use the Acceptance/VST/IA Frequency tables included in this appendix for acceptance and Independent Assurance (IA) testing. If a testing method or frequencies is not cited, the Materials Manual of Instruction test method and frequencies shall be used. Some Quality Assurance programs depend on project samples to be tested for verification. These are denoted as verification samples and tests (VST) in the tables.

Locally Administered Projects using:

1. Design-Build model
2. Public-Private Partnership delivery model
3. Contractor performs testing (QC testing)

Scope performed by Contractor QC highlighted this color.

Scope performed by MBP/ECS highlighted this color.

Acceptance/VST/IA Frequency - Soil & Aggregate

Material Type	Spec Section	Test Reference	Acceptance Testing (Scope performed by Contractor QC highlighted this color.)	VST	IA (Scope performed by MBP/ECS highlighted this color.)	
Backfill	Contract Special Provisions					
Moisture Density Relations-Standard Proctor, Atterberg Limits & Grain Size Analysis (All Backfill Types)		VTM-1, VTM-7, & VTM-25	Done during project development	NA	Non required if performed in VDOT or AMRL accredited laboratory	ECS is AMRL accredited
One Point Proctor Check Compare to Nuclear Gauge		VTM 012	As needed.	NA	Run split sample when needed. 1 test per project to check procedure and equipment.	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.
In Place Density Tests:						
Box Culverts, Pipes & other Drainage Structures	302,303	VTM-10	A minimum of one (1) test shall be performed per lift on alternating sides of the structure for each 300 linear ft. or portion thereof in structure length. This test pattern shall begin after the first 4-in. compacted layer above the structure's bedding and shall continue to one (1) foot above the top of the structure.	NA	One IA shall be conducted on each compaction technician once per project regardless of the structure or material type (box culvert, pipe, Abutment, retaining wall or embankment). IA shall consist of a split density test in situ, observing technician technique, checking equipment calibrations and calculations.	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.

Abutments, Retaining Walls and MSE Walls	Sections 303,401	VTM-10	A minimum of two (2) tests every other lift up to 100 linear ft. shall be performed. Testing shall be performed behind these structures at a distance from the heel no farther than a length equal to the height of the structure plus 10 ft. For MSE Walls, Less than 100 linear ft. a minimum of one (1) test every other lift shall be performed. The testing shall be performed a minimum distance of 8 ft. away from the face of the wall, to within three feet of the back edge of the zone of the reinforced fill area. Test sites shall be staggered throughout the length of the wall to obtain uniform coverage. Testing shall begin after the first two (2) lifts of reinforced fill have been placed and compacted. Walls more than 100 linear ft., a minimum of two (2) tests every other lift not to exceed 200 linear ft. shall be performed.	NA	One IA shall be conducted on each compaction technician once per project regardless of the structure or material type (box culvert, pipe, Abutment, retaining wall or embankment). IA shall consist of a split density test in situ, observing technician technique, checking equipment calibrations and calculations.
SOILS/ EMBANKMENT					

Moisture Density Relations-Standard Proctor, Atterberg Limits & Grain Size Analysis (Soils/Embankment)		VTM-1, VTM-7, & VTM-25	Done during project development	NA	1 test per year during production; minimally perform one (1) in first five (5) tests taken for QA	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.
One Point Proctor Check Compare to Nuclear Gauge (Soils/Embankment)		VTM 012	As needed.	NA	1 test per year during production; minimally perform one (1) in first five (5) tests taken for QA	
Embankment in Place Density (Soils/Embankment)	Sect. 303	VTM-10	The minimum number of field density tests required shall be one for each 2500 yd^3 or less of fill material placed, with the following additional requirements: (a) For fill areas less than 500 ft. in length, a minimum of one (1) field density test for every other 6-in. compacted layer from the bottom to the top of fill starting with the second lift. (b) For fills 500 to 2000 ft. in length, a minimum of two (2) field density tests for each 6-in. compacted layer within the top five (5) ft. of fill. (c) For fills greater than 2000 ft. in length, break into equal sections not to exceed 2000 ft. and test each section in accordance with (b) above.	NA	One IA shall be conducted on each compaction technician once per project regardless of the structure or material type (box culvert, pipe, Abutment, retaining wall or embankment). IA shall consist of a split density test in situ, observing technician technique, checking equipment calibrations and calculations	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.
Subgrade	Sec. 305	VTM-10	In the finished subgrade in both cut and fill sections, a minimum of one (1) test represented by the average of five nuclear density	NA	One IA shall be conducted on each compaction technician once per project regardless of the structure or material type (box culvert, pipe, Abutment,	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.

			readings shall be performed for each 2000 linear ft. of subgrade for each roadway (full width).		retaining wall or embankment). IA shall consist of a split density test in situ, observing technician technique, checking equipment calibrations and calculations	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.
Aggregate Base and Subbase Material	VDOT Sections 306, 307, & 309					
Depth Checks		VTM-38	For Method VTM-38A, one (1) depth test shall be conducted for each one-half (1/2) mile of stabilization per paver (mixer) application width. In other words, each separately applied width of stabilization, regardless of roadway width, shall require a series of tests. For method VTM-38B, the project shall be divided into lots, with each lot stratified, and the location of each test within the stratified section determined randomly. A lot of material is defined as the quantity being tested for	NA	Minimum of one per project, unless quantity of individual material(Base, sub-base, etc.) is less than 500 tons per project, in which case no IA test required for that material	A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.

			acceptance, except the maximum lot size shall be two (2) miles for each paver application width. The randomization procedure used shall be at the direction of the Engineer. (See VTM-38 for example.) Samples shall be taken from the lot at the following rate: Lot Size No. of Samples Required 0 - 1 Mile 2 1 - 1 1/2 Miles 3 1 1/2 - 2 Miles 4		
In Place Density		VTM-10	When the subgrade, consisting of material-in-place or imported material other than aggregate base, subbase, or select material, is stabilized with cement or lime, one density test (average of 5 readings) shall be conducted for each one-half (1/2) mile of stabilization per paver (mixer) application width. In other words, each separately applied width of stabilization, regardless of roadway width, shall require a separate series of tests.	NA	One test per project, consisting of the average of 5 readings. Minimum of 5 readings per project, unless total quantity of individual material(Base, sub-base, etc.) is less than 500 tons per project, in which case no IA test

A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.

Treated Subgrade/Subbase, Aggregate Base Material, and Cement Treated Aggregate Base Material	VDOT Sections 306, 307, & 309				
Depth Checks		VTM-38	For Method VTM-38A, one (1) depth test shall be conducted for each one-half (1/2) mile of stabilization per paver (mixer) application width. In other words, each separately applied width of stabilization, regardless of roadway width, shall require a series of tests. For method VTM-38B, the project shall be divided into lots, with each lot stratified, and the location of each test within the stratified section determined randomly. A lot of material is defined as the quantity being tested for acceptance, except the maximum lot size shall be two (2) miles for each paver application width. The randomization procedure used shall be at the direction of the Engineer.	NA	Minimum of one per project, unless quantity of individual material(Base, sub-base, etc.) is less than 500 tons per project, in which case no IA test required for that material

			(See VTM-38 for example.) Samples shall be taken from the lot at the following rate: Lot Size No. of Samples Required 0 - 1 Mile 2 1 - 1 1/2 Miles 3 1 1/2 - 2 Miles 4		
In Place Density		VTM-10	When the subgrade, consisting of material-in-place or imported material other than aggregate base, subbase, or select material, is stabilized with cement or lime, one density test (average of 5 readings) shall be conducted for each one-half (1/2) mile of stabilization per paver (mixer) application width. In other words, each separately applied width of stabilization, regardless of roadway width, shall require a separate series of tests.	NA	One test per project, consisting of the average of 5 readings. Minimum of 5 readings per project, unless total quantity of individual material(Base, sub-base, etc.) is less than 500 tons per project, in which case no IA test
Clearing and Grubbing	VDOT Section 301				
Ensure activities are confined to limits and seeded within 30 days of disturbance		N/A	Daily		Weekly

Erosion and Siltation Control	VDOT Section 303.03 & Current Virginia DCR Specifications				
Monitor for correct installation and Maintenance		N/A	Daily		After rain event
Undercut	VDOT Section 303.04				
Review area to determine need for undercut		N/A	Prior to start of work at each location	All reports reviewed by Locality Project Manager to verify qualified inspector and correct equipment	One (1) report reviewed per month during production to verify qualified inspector and qualified personnel
Measure undercut area		N/A	Prior to backfill at each location	All calculations/reports checked/reviewed by Locality Project Manager to verify qualified inspector and correct equipment	One (1) calculation/report checked/reviewed to verify qualified inspector and correct equipment
Overlay Sands					
Grade D Silica Sand	Special Provision		One bag per project tested in AMRL lab.	NA	NA

Acceptance/VST/IA Frequency - Hydraulic Cement Concrete

Material Type	Spec Section	Test Reference	Acceptance Testing	VST	IA
Cast-In-Place Structures and Bridge Concrete	VDOT Section 217				
Concrete Entrained Air Content (CIP Concrete)	217.08	ASTM C231 or C173	Test every load, except for bridge decks, in which case one test per truck-load for the first 3 trucks and then one test for every third truckload thereafter, provided results remain within 1.0% of median of design range. Test also required when making compressive specimens	NA	One test shall be made on the same batches of concrete from which cylinders are taken
Slump of Hydraulic Cement Concrete (CIP Concrete)	217.08	ASTM 143	Test every load and when making compressive specimens	NA	One test shall be made on the same batches of concrete from which cylinders are taken
Temperature of Concrete (CIP Concrete)	217.10	ASTM C1064	Test every load and when making compressive specimens	NA	One test shall be made on the same batches of concrete from which cylinders are taken

Compressive Strength of Concrete Cylinders (CIP Concrete)	217.08	ASTM C31 & C39	One set of three cylinders per every 100 CY and at least two sets of cylinders per structure per class of concrete.	NA	Minimum of one set per 1000 cubic yards of structural concrete. Not required for projects having less than 300 cubic yards. Cylinders should be from the same load as acceptance samples.
Chloride Permeability Concrete Cylinders (CIP Concrete)	Check Plan sheets	VTM-112	One set of two cylinders per every 100 CY and at least two sets of cylinders per structure per class of concrete.	NA	Non required if performed in VDOT or AMRL accredited laboratory
Concrete Reinforcing Steel (CIP Concrete) elongation, yield strength and ultimate strength	223	ASTM A615	Accepted based on certification provided by the fabricator. Verify manufacturer's certificates for every shipment for acceptance prior to placement.	One sample per project per manufacturer per most common size bar.	Non required if performed in VDOT or AMRL accredited laboratory
Pavement	VDOT Section 217				
Concrete Entrained Air Content (Pavement)	217.08	ASTM C231 or C173	One test per hour & when casting flexural specimens	NA	One test per four roadway miles or fraction thereof, with a minimum of one per project

Slump of Hydraulic Cement Concrete (Pavement)	217.08	ASTM 143	Two tests daily & when making flexural specimens	NA	One test shall be made on the same batches of concrete from which cylinders taken
Temperature of Concrete (Pavement)	217.10	ASTM C1064	One test per hour & when casting flexural specimens	NA	One test shall be made on the same batches of concrete from which cylinders taken.
Compressive Strength of Concrete Cylinders (Pavement)	217.08	ASTM C31 & C39	If pavement is accepted based on cylinder strength. One (1) set of three (3) cylinders cast for every 100 cy and at least one for each days concreting operation	NA	Minimum one set per 1000 cubic yards of structural concrete, except that IA will not be required for projects having less than 300 cubic yards.
Flexural Strength Beams	316.04	ASTM C293	If pavement is to be used as haul road or prior to 14 days then, At least one beam cast for each days concreting operation.	NA	NA
Concrete Reinforcing Steel (pavement) elongation, yield strength and ultimate strength	223	ASTM A615	Accepted based on certification provided by the fabricator. Verify manufacturer's certificates for every shipment for acceptance prior to placement.	One sample of two pieces 24 inches long from the most prevalent bar size per structure, with no two samples being the same size	Non required if performed in VDOT or AMRL accredited laboratory
Miscellaneous Concrete	VDOT Section 217				
Concrete Entrained Air Content (Miscellaneous Concrete)	217.08	ASTM C231 & C173	One test per day and when making compressive specimens	NA	NA

Slump of Hydraulic Cement Concrete (Miscellaneous Concrete)	217.08	ASTM C143	One test per day and when making compressive specimens	NA	NA
Temperature of Concrete (Miscellaneous Concrete)	217.10	ASTM C1064	One test per day and when making compressive specimens	NA	NA
Compressive Strength of Concrete Cylinders (Miscellaneous Concrete)	217.08	ASTM C31 & C 39	One (1) set of three (3) cylinders per every 250 CY and at least one set per day	NA	One (1) set of three (3) cylinders per every 25,000 CY (cumulative) minimum 1 per project.
Concrete Reinforcing Steel (Miscellaneous Concrete)	223	ASTM A615	Accepted based on certification provided by the fabricator. Verify manufacturer's certificates for every shipment for acceptance prior to placement.	One sample of two pieces 24 inches long from the most prevalent bar size per structure, with no two samples being the same size	Non required if performed in VDOT or AMRL accredited laboratory
Concrete Curing Materials	VDOT Section 220				
Burlap		AASHTO M182, class 3	Verification of LM # and lot numbers if from QA supplier Approved list 44, if not test one sample per lot number	NA	Non required if performed in VDOT or AMRL accredited laboratory
White liquid membrane Curing Compound		VTM - 2	Verification of LM # and batch numbers if from QA supplier Approved list 44, if not test one sample per batch number	NA	Non required if performed in VDOT or AMRL accredited laboratory
Fugitive Dye Liquid Membrane Curing Compound		VTM - 2	Verification of LM # and batch numbers if from QA supplier Approved list 44, if not test one sample per batch number	NA	Non required if performed in VDOT or AMRL accredited laboratory

A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing. IA cylinders to be cured and broken at Salem District Materials Lab

Polyethylene Film		AASHTO M171	Verification of LM # and lot numbers if from QA supplier Approved list 44, if not test one sample per lot number	NA	Non required if performed in VDOT or AMRL accredited laboratory

QC/VST/IA Frequency - Asphalt

Material Type	Spec Section	Test Reference	Contractor QC Testing	VST	IA
Asphalt Concrete Pavement	VDOT Section 315				
Pavement Density by Nuclear Method with In Place Pavement Density (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.)	VST is performed on Twenty (20) percent of QC lots. Obtain two cores in one randomly selected QC lot out of five lots to verify in place density. Minimum one VST sample per project.	IA=10%*QC Readings Locality representative observe and witness QC testing to assure gauge is calibrated and accurate. Observe and verify test sites are random and match selected sites. Verify that QC tests are done using proper procedures. Observe one control strip per density technician and obtain all cores from control strip for reweighing in laboratory (randomly select a minimum 10% of cores) to confirm field density testing.

In Place Pavement Density (for all asphalt except Stone Matrix Asphalt (SMA))		VTM-006; VTM-32	**Density** - min. 1 core per location not long enough to establish roller pattern/control strip	**Density -** One (1) random core per 10 QC locations. Independent of contractor cores.	Obtain cores taken for density. Reweigh at least 10% of these cores in laboratory to confirm density. Observe one (1) density determination per ten (10) locations performed by QC technician. Minimum 1 per project.
Depth Checks		VTM-32	Depth checks of surface and intermediate material required only if specific plan depths are called for, not when plans specify rate of application. One (1) per 1/2 mile per lane width, minimum one (1) test per roadway, maximum lot size 2 mile (4 tests)	NA	Select one (1) QC core per five (5) lots and remeasure thickness. A minimum of one (1) per project.
In Place Pavement Density and Depth Checks by cores for Stone Matrix Asphalt (SMA)		VTM-006	Establish trial section and test sections. Minimum of one (1) sample per 1,000 feet with a maximum of 5 samples per day/night's production for density and depth for test sections. Three (3) cores for test strip.	Two (2) stratified random cores per one day/ night production obtained independently of contractor. Minimum two (2) per project.	Locality Representative Independently weigh and measure a minimum of one (1) QC core per day/night's production Locality representative will observe the taking of these cores and will maintain control of these cores once obtained
Permanent Pavement Marking	VDOT Section 512		**Contractor QC Testing**	**VST**	**IA**

A different Inspector & equipment supplied by either MBP or ECS, Independent from inspector performing acceptance testing.

Permanent Pavement Marking - Preformed Tape		VTM-94	Daily perform VTM 94 at start up with periodic checks every three hours of operation	Randomly select three (3) ten foot in place sections of markings per day and measure thickness and width. Skip lines and edge lines are considered separately. Inspect PM for correct placement, straightness and edges. Observe the bead embedment, color (night and day) and brightness/reflectivity Inspect structure of tape to ensure patterned waffles have not been damaged by roller	Review all C-85 reports during production to verify that plan quantities match application quantities and that daily measurements are performed according to VTM 94.
Permanent Pavement Marking - Liquid Materials (Paint, thermoplastic and epoxy)		VTM-94	Daily perform VTM 94 at start up with periodic checks every three hours of operation	Randomly select three (3) ten-foot in place sections of markings per day and measure thickness and width. Skip lines and edge lines are considered separately. Inspect PM for correct placement, straightness and edges. Observe the bead embedment, color (night and day) and brightness/reflectivity. Review application rates to ensure proper thickness has been applied	Review start up calibrations. Ensure one plate sample is taken and tested for thickness, width, bead distribution and embedment. Retain sample for further testing if needed. Review all C-85 reports during production to verify that calculated quantities match application rates and that daily measurements are performed according to VTM 94.

QC/VST/IA Frequency - Misc Roadway and Structure

Material Type	Spec Section	Test Reference	QC Testing	VST	IA
Pre-cast Structures	VDOT Section 404				
Verify bedding material is installed properly and that pre-cast materials are not chipped or cracked		N/A	Daily and when shipment arrives on project	Inspect Precast structure before backfilling operations begin.	Inspect Pre-cast structures when received on job site. Inspect bedding before setting structure.
Load Bearing Piles	VDOT Section 403				
Monitor operation and document blow counts		N/A	Continuously	Review documentation weekly.	Daily
Perform Center of Gravity Calculations		N/A	For each Foundation	one out of every twenty (20) foundations	one out of every ten (10) foundations
Structural Steel	VDOT Section 407				
Receive Bolts, sample, verify the documentation is complete and perform laboratory Skidmore, tension and galvanized coating testing	VDOT 226.02(h)		Each nut-bolt-washer (NBW) assembly lot shall be sampled at a minimum rate of 2 assemblies per NBW lot. The documentation	Ea. NBW assembly lot shall be tested, one bolt in direct tension, one assembly for galvanized coating and one nut and bolt for rotational capacity testing (Rot-	The documentation shall be reviewed to insure all parts are present and that the required tests have been performed by the producers and that the markings match the

			shall be collected from the bolt supplier and the galvanizer for each lot and supplied along with the samples to the QAM. QC personnel shall monitor the storage and conditions of the bolts to insure they remain in good well lubricated condition.	Cap) as per section 226	suppliers. The results of the VST shall be reviewed to insure the material passed the tests.
Verify daily Skidmore testing is performed IAW (in accordance with) proper procedures for each lot Note: NBW assembly may be reused after Skidmore testing in a connection if no defects are noted in visual inspection and the nut runs freely up the bolt for the full thread length - Only new NBW assemblies may be tested each day	VDOT 407.06(c)		Ea. Day & Ea. NBW lot (3 bolts per lot) used shall be Rot-Cap tested in the Skidmore device IAW proper procedures	Minimum three (3) NBW assemblies for each lot being installed shall be observed by the IA inspector	Three NBW assemblies from each lot shall be Rot-Cap tested at the QAMs lab independently each week during erection
Verify the installation crews are using proper installation procedures IAW specs. to tension the bolts	VDOT 407.06		Monitor ea. Crew (2-3 workers) during erection to insure proper technique (TOTN – turn-of-the-nut or DTI – direct tension indicating washers) is followed	NA	Monitor ea. Crew (2-3 workers) for a half dozen NBW assemblies once at the beginning of each four hour work period
Verify the bolted connections have been tensioned properly using statistical sampling frequency and a calibrated torque wrench	VDOT 407.06(c)4	ASTM 325	For each connection, test 10% or a minimum of 2 NBW assemblies verifying the required torque. Complete testing before the deck is formed.	Test 2 NBW assemblies in 25% of the slip critical connections (minimum of 2 connections per transverse line of splices) and 2 NBW assemblies in 10% of the secondary member connections	Monitor all the torque testing for each main member connection (slip-critical connections) and at the beginning of each period where secondary members are being checked.

Rebar Splicer (Tension Test)		ASTM A615	1 sample per manufacturer per most common size per structure (Contractor is to install pieces)	NA	Verify Machine Calibration annually
Protective Coating of Metal Structures	VDOT Section 411		**Contractor QC testing**	**VST**	**IA**
Monitor surface preparation		SSPC-PA	Three surface profile measurements per day of blasting.	Review all reports showing the preparation protocols	Two (2) surface profile measurements per week of blasting.
check coating thickness according to SSPC -PA		SSPC-PA	Five(5) spot measurements (15 Readings) per day as defined in PA-2 for coating thickness after each layer of paint at each location	Review all reports showing-painting application rates including the tests performed on profiles and thicknesses.	One spot measurement (3 readings) as defined in PA-2 for coating thickness after each layer of paint at each location
Underdrains	VDOT Section 501				
Inspect to ensure no deficiencies		VTM 108	All accessible outlet locations; Additionally a minimum of 10% of longitudinal sections	One (1) every twenty-five (25) outlet locations. A minimum of one per project independent of IA.	Observe 10% of outlet locations; Additionally a minimum of 1% of longitudinal sections
Guardrail	VDOT Section 505				
Verify that guardrail is installed per specifications and at proper height			Daily	Spot-check every 50 linear feet for proper height	Spot-check every 500 linear feet for proper height.

Fencing	VDOT Section 507				
Verify fencing type, height and location		N/A	Daily	Weekly	
Barbed Wire	VDOT Section 242	ASTM A121	One sample every 50 rolls or spools	NA	NA
Chainlink Fence	VDOT Section 242	AASHTO M181	One sample from 3 rolls for every 50 rolls.	NA	NA
ROW Monuments	VDOT Section 503				
Verify monument type and location		N/A	10% of ROW monuments	1% of ROW monuments	
Maintenance of Traffic	VDOT Section 512				
Monitor installation and maintenance and use Work Zone Safety Checklist		N/A	Daily (Locality Inspector)	Weekly (Locality Project Manager)	
Sound Wall Barriers	VDOT Section 519				
Verify location and installation with shop drawings		N/A	Daily	Weekly	
Topsoil and Seeding	VDOT Section 602/603				

Verify proper material is utilized at application rates from plans		N/A	Daily	Weekly	
Traffic Signs	VDOT Section 512				
Verify that signs meeting current standards are utilized in locations per plans		N/A	Daily	Weekly	
Traffic Signals	VDOT Section 703				
Monitor installation for conformance with plans and specifications		N/A	Daily	Weekly	
Water and Sewer Facilities	VDOT Section 520				
Monitor installation for conformance with plans and specifications		N/A	Daily	Weekly	
Electrical and Signal Components	VDOT Section 238				
Tether Wire		ASTM A475	One sample per project	NA	NA
Span Wire		ASTM A475	One sample per project	NA	NA
Masonry	VDOT Section 202				
Wall Units			one sample consisting of 10 units per 10,000	NA	NA

			units		

- Verification testing shall be required if contractor's workforce performs QC testing that is used for Acceptance testing. If Locality or its consultant performs Acceptance testing, Verification testing shall not be required.
- IA testing shall be conducted by different personnel and different equipment than used for the QC/acceptance testing, QC/acceptance sampling or Verification testing.