

## **CHAPTER 10 INSTALLATION, ACCEPTANCE AND INVENTORY OF MATERIALS**

### **OBJECTIVES**

- 1) Quality and Workmanship
- 2) Pre-Installation Considerations/Responsibilities
- 3) Installation
- 4) Acceptance of Materials
- 5) Materials Inventory Tracking Program

### **QUALITY AND WORKMANSHIP**

The successful installation of pavement markings depends upon a logical sequence of events that involves planning, installation, and acceptance. These steps are necessary to ensure that:

- All materials have been tested in accordance with the specifications. Quality Control/Quality Assurance (QC/QA) or acceptance testing shall be performed as set forth in each agency's material testing specifications.
- Proper markings are installed at the intended locations.
- The completed installation meets the criteria established in the specifications for quality and workmanship.
- The finished product is aesthetically pleasing and provides clear direction to motorists.

### **PRE-INSTALLATION CONSIDERATIONS**

To ensure quality, there are some important steps that must be taken before the pavement marking material is installed.

The three primary objectives of project management that must be met before any markings are applied are Material Verification, Review of pavement marking layout details, and Pre-construction discussion.

#### **Material Verification**

To verify that the correct materials are supplied and used on the job, the contract material specifications must first be reviewed. Material test results and/or products must then be compared against specifications to ensure that they are correct. Project inspectors and contractors must be familiar with the application requirements for all the specified material. Materials may be specified or required in several areas of the contract. Specifications may be modified or changed through addendums or special provisions. All additions to the published specifications, as well as the effective date of the specifications and standards, are listed in the job proposal.

#### **Review of Pavement Marking Layout Details**

The layout of all markings shall be reviewed in detail. Additionally, all drawings and measurements shall be reviewed for accuracy. The layout is either included in the plans or referenced in the standard plans and drawings.

### **Pre-construction Discussion**

Agencies typically require that only materials approved by the engineer shall be used on the project. At the pre-construction meeting, the project engineer, inspector and contractor will review and discuss the acceptance procedures and specifications in general. The type of materials, methods of application, and other installation considerations should be discussed.

## **PRE-INSTALLATION RESPONSIBILITIES**

### **Agency (VDOT) Responsibilities:**

- Review the MUTCD and established specifications to determine the correct location and type of pavement marking to be installed.
- Project Inspectors ensure:
  - That weather and surface conditions comply with specifications
  - Periodic monitoring is performed at the start of the day and every 3 hours thereafter.
  - Any unsatisfactory work is reported to the contractor immediately.
- Project personnel shall ensure that an approved source of materials has been furnished for the types of materials used.
- The project inspector shall ensure that weather and surface conditions comply with the specification requirements prior to allowing pavement marking operations to begin.
- The project personnel shall ensure that the pavement marking field layout (pre-marking) conforms to plans and MUTCD requirements.
- The project personnel shall ensure, through random inspection, that materials are applied in accordance with contract documents.

### **Contractor's Responsibilities:**

- The contractor's QC Technician should ensure the Inventory Tracking Documents are on hand for all pavement marking materials used.
- The plans, contract, specifications, and MUTCD shall be reviewed to determine the location and type of pavement markings to be installed. Also, review the plans and the contract to ensure that the type of material specified conforms to the contract documents.
- A copy of the manufacturer's installation recommendations must be obtained and supplied by the contractor for the type of materials used. Specific recommendations shall be followed in conjunction with the specifications.
- A copy of the Material Safety Data Sheet (MSDS) must be obtained, as required by Occupational Safety and Health Administration (OSHA) for each type of material to be used or work is not to proceed.
- The contractor must obtain and complete all required documents from the governing agency.
- The QC technician shall ensure that weather and surface conditions comply with the specification

requirements prior to allowing pavement marking operations to begin.

- The QC technician shall ensure that the pavement marking field layout (pre-marking) conforms to plans and MUTCD requirements.
- The QC technician shall ensure, through random inspection, that materials are applied in accordance with contract documents.
- Striping equipment shall be checked for proper calibration and obvious mechanical deficiencies. The contractor is required to demonstrate that all equipment is capable of performing the intended work prior to beginning actual application.

## **INSTALLATION**

Safety Considerations: Traffic control must be constantly monitored to minimize disruption and to ensure compliance with the government agency's traffic control manual and the MUTCD. Workers shall wear hard hats, safety vests and steel-toed shoes/boots.

The contractor shall measure the application thickness, color, and the bead application rate at the beginning of each workday and a minimum of every three hours thereafter, for paint, thermoplastic, and epoxy. State agency specifications designate required procedures. Once application of the pavement markings begins, the following items should be closely monitored:

- Material temperatures shall be randomly checked during application.
- In order to prevent tracking, the applied material must be cured sufficiently to ensure tracking does not occur.
- The temporary pavement markers should be installed according to the contract documents, specifications, and manufacturer recommendations.
- The contractor's quality control technician must constantly monitor the quality and workmanship of the material being applied. Line width, length, thickness, and color shall be checked frequently to ensure compliance with the contract documents, and a written report (quality control report) shall be submitted to the agency's inspector.
- Unacceptable work must be identified, reported to the contractor, and corrected prior to further application and final payment.
- Pay quantities for materials being applied shall be measured and documented after each operation.
- Payment for completed work shall be dependent on compliance to contract requirements and the quality of the work.

## **ACCEPTANCE OF MATERIALS**

State agencies (DOT's), cities and towns will specify their requirements for acceptance of pavement marking materials. (Refer to Appendix B-2 for VDOT Guidelines)

## **MATERIALS INVENTORY TRACKING PROGRAM**

State agencies (DOT's), cities and towns will specify their requirements for Inventory Tracking of Pavement Marking Materials. (Refer to Appendix B-3 for VDOT Guidelines)

## VIRGINIA DOT REFERENCES

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See Appendix A for the following:

### **VIRGINIA DOT ROAD & BRIDGE SPECIFICATIONS**

SECTION 246 PAVEMENT MARKING

SECTION 512 MAINTAINING TRAFFIC

SECTION 704 PAVEMENT MARKINGS

See Appendix B for the following:

### **VIRGINIA DOT MANUAL OF INSTRUCTIONS**

Section 204.30 (a) (1) and (2)

(1) Sampling, Testing, and Approval

(2) Acceptance (Requirement, Cert. I or Cert. II)

See Appendix C for the following:

### **VIRGINIA TEST METHOD**

VTM-94 Quality Control Testing of Pavement Markings

**Chapter 10**  
**Installation & Quality Control**  
**Review Questions**

1. VDOT requires that by the end of each workday, form C-85, “Contractor’s Daily Log and Quality Control Report”, must be signed by the Contractor and submitted to the:
  - a) Materials Division
  - b) contractor’s certified Q.C. technician
  - c) Engineer
  - d) State Police
  
2. VDOT specs. state that before proceeding with work, surface temperature and weather conditions must be checked for compliance with the specifications by the:
  - a) project inspector
  - b) contractor’s certified Q.C. technician
  - c) paint truck operator
  - d) traffic engineer
  
3. Layouts for pavement markings must be in conformance with:
  - a) Special Product Evaluation List.
  - b) The Manual on Uniform Traffic Control Devices(MUTCD).
  - c) Virginia Test Method Manual (VTM).
  - d) Materials Division Manual of Instructions.
  
4. VDOT requires that quality control tests be conducted in accordance with:
  - a) The 1994 Road and Bridge Standards.
  - b) The MUTCD.
  - c) The manufacturer’s recommendations.
  - d) VTM-94.
  
5. Which of the following is not covered in (Virginia Test Method) VTM-94?
  - a) checking for moisture in the pavement
  - b) measuring pay quantities
  - c) visual inspection
  - b) checking wet film mil thickness
  
6. What topics should be discussed at the pre-construction conference held prior to beginning pavement marking operations?
  - a) specifications
  - b) type of materials
  - c) method of application
  - d) all of the above

7. A copy of the manufacturer's recommended installation instructions for pavement marking tapes does not have to be supplied by the contractor.
  - a) True
  - b) False
  
8. A Material Safety Data Sheet (MSDS) must be obtained by the contractor for each material required for a particular type of pavement marking.
  - a) True
  - b) False
  
9. In Virginia, traffic control must be constantly monitored to minimize disruption and to ensure compliance with:
  - a) The Virginia Work Area Protection Manual
  - b) The Materials Division Manual of Instructions
  - c) the MUTCD
  - d) all of the above
  - e) a and c
  
10. The contractor is required to measure the application thickness and bead application rate:
  - a) before completing the work.
  - b) at the beginning of each workday and every three hours thereafter.
  - c) once.
  - d) twice daily.
  
11. Both the contractor and the inspector should constantly monitor the installation and quality of the material being placed.
  - a) True
  - b) False
  
12. In addition to application rates and glass bead distribution, markings should be inspected with regard to:
  - a) width
  - b) length
  - c) color
  - d) all of the above

13. VDOT requires in order that corrective action be taken, the inspector should immediately report unacceptable work to:
  - a) the manufacturer.
  - b) the resident engineer.
  - c) the contractor.
  - d) none of the above
  
14. When should pay quantities be compared and confirmed by the contractor and inspector?
  - a) before proceeding with the work
  - b) at the end of each operation or the end of each workday
  - c) before the end of the project
  - d) only at estimate time
  
15. The Virginia specifications requiring the contractor to maintain an approved Inventory Tracking System are found in:
  - a) Section 704
  - b) Section 512
  - c) Table VII-1
  - d) Division II
  
16. Before beginning work, the Source of Materials Document is required to insure that:
  - a) only approved materials are used
  - b) appropriate test coverage is obtained
  - c) only tested material arrives at the project
  - d) all of the above
  
17. VDOT specifications require the Materials Inventory Tracking system to be maintained by the:
  - a) Contractor
  - b) Project Engineer
  - c) Materials Section
  - d) District Administrator
  
18. The contractor's inventory is monitored by the:
  - a) Materials Section Industrial Inspector
  - b) District Materials Engineer
  - c) Resident Engineer
  - d) Commissioner

19. Inventory Tracking Ledgers are maintained by the Contractor.
  - a) True
  - b) False
  
20. Copies of Certifications I & II are always delivered to the project.
  - a) True
  - b) False
  
21. Copies of materials certifications are to be retained by the contractor as part of the Materials Inventory Tracking documentation.
  - a) True
  - b) False
  
22. When materials are delivered directly from the manufacturer to a VDOT project, the project inspector will contact:
  - a) The Traffic Engineer
  - b) District Materials Section Industrial Inspector
  - c) The manufacturer
  - d) The Resident Engineer
  
23. When materials are delivered directly from the manufacturer to a VDOT project, the contractor will be required to maintain an Inventory Tracking Program.
  - a) True
  - b) False
  
24. Contractor's Daily Log and Quality Control Report (C-85) is required on Federal Projects only.
  - a) True
  - b) False