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 four primary objectives of project management that must be met before any markings are applied are Material Verification, Road Surface Considerations, Review of Pavement Marking Layout Details, and Pre-construction Discussion.

1) 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.

2) Road Surface Considerations
The contractor will need to consider the road surface, the proper application and pavement marking adhesion. Road surfaces can be concrete, asphalt, chip seal or slurry seal. Follow the
manufacturers’ installation recommendations. Generally, for chip seal and slurry, a cure time from 1 - 14 days is needed to allow the moisture to escape before pavement marking can be successfully applied.

3) 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.

4) 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.

• Weather conditions should be monitored

• 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 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 VA Work Area Protection Manual (WAPM) 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 or at the end of the day’s operation.

• Payment for completed work shall be dependent on compliance to contract requirements and the quality of the work.
ACCESSION OF MATERIALS

The Source of Materials Document:
The VDOT form C-25 is commonly called the “Source of Materials” document. A source of materials is required to be submitted by the contractor no later that seven (7) days prior to start of work so that testing, sampling and acceptance can be pre-assigned.

This document details to the Department where and from whom the contractor will obtain the material. Upon assignment of the method of acceptance or inspection, the document is returned to the project and Contractor. This is done so that untested material does not arrive on the job site and cause delays while the material is being sampled and tested. Sometimes it is necessary to assign “on the job sampling”.

NOTE: The Source of Materials Document (C-25) can be submitted electronically via the VDOT website. Each district will process the Source of Materials document for each project specific to that district.

Section 106.01(b): The details of how pavement markings are to be accepted and the documentation necessary for the project records are detailed in the Materials Division Manual of Instructions. Also detailed is how a sample is to be taken and how much that sample can represent. An attempt is made to either sample or pre-approve at the source of supply to facilitate ease of acceptance.

Material is accepted by one of following methods:

1) Certification I - Batch tested
2) Certification II - Approved List and requires manufacturers certification letter
3) Special Product Evaluation List (SPEL)
4) Visual Acceptance

Certification I

Materials that are required to be tested as a batch or lot before use on a project. Each new batch or lot produced, must be tested and accepted before use. Examples of materials requiring Certification I are paint, thermoplastic, epoxy, polyester and glass beads.

The Certification I statement should read: We certify that our product (batch or lot number) ______ on invoice number ______ or shipping ticket number ______ has been sampled, tested, and approved by VDOT Materials Division as indicated by Laboratory Test Number, MS ____, or by an approved Quality Control Plan as indicated by its unique test number ____.

Note: Some materials that require a Certification I may be included on an Approved List. (Refer to Certification II for an explanation of the Approved List or QPL). However, every batch or lot produced must still be tested and approved before use.

Certification II

Materials that are tested and approved for use far in advance of their need on a project. Once these materials are approved, they are placed on an Approved List (or Qualified Products List - QPL) in the Manual of Instructions.
Some materials (pavement marking tape, pavement markers) don’t have to be tested before use on each project. The Contractor simply selects these materials from the Approved List and begins using them.

These materials should arrive on the project with the following Certification II statement: We certify that our product has been tested, approved, and placed on a qualified products list. We certify that our (batch or lot number) ________on invoice number ________is the same product that was tested and approved. Indicated on the shipping document will be the test number from the approved list.

Special Product Evaluation List (S.P.E.L.)

Some selected materials may be used on projects under a trial basis. These materials are normally used along side approved materials and are monitored for performance. The S.P.E.L. Committee oversees these trials and makes recommendations for possible future use.

Visual Acceptance

The visual evaluation of pavement marking materials finished products on the road.

Materials Inventory Tracking Program

State agencies (DOT’s), cities and towns will specify their requirements for acceptance of pavement marking materials.

Section 704 of the Road and Bridge Specifications and the Manual of Instructions require the Contractor to use an approved inventory tracking system for all materials received from the Manufacturer.

The program consists of three (3) primary components:

1) **The Source of Materials Document** - The C-25 (Discussed on page 10-3)

2) **Inventory Ledger** - The striping Contractor maintains a running inventory of all materials received and shipped. When the records associated with the inventory are examined, a given load or batch of material received by the striping Contractor can be tracked to all projects where it was used. Thus it is readily apparent when a given batch has been exhausted. Furthermore, shipments of all materials can be tracked over a period of time. (Refer to Page B-10 for Inventory Ledger)
3) **Contractors Daily Log and Quality Control Report (C-85)** - The Contractor’s Certified Pavement Marking Technician shall fill out this report completely (in accordance with Section 704.03(a) of the Road & Bridge Specifications) by hand in ink on a daily basis or at the end of each operation to track materials used, quantities installed or eradicated, certification information, material test numbers (MS No.), work completed (with locations), and recorded Quality Control test results. C-85 forms submitted for project records shall not be modified to incorporate any other information such as contractor personnel, equipment used, etc. The following data must be included on the C-85 form:

1. General Information - Contractors name, project number, date, start time, finish time, weather conditions, air temperatures and surface temperatures.

2. Materials Documentation - Type of material, quantity, unit of measure, certification type, MS number, an expiration date of material.

3. Work Completed - Type of material, contract item number, quantity, location installed, width and color of marking.

4. Quality Control Measurements - Type of material, quality control measurement used, location of test, time of test and inspector’s initials.

5. Signatures and dates by both the contractor’s certified Pavement Marking Technician and the Engineer (VDOT Inspector)

Note: If the C-85 is in an electronic format, it must be current and in a printable form in order to be available for the Pavement marking Technician and the VDOT representative’s signature.

The Contractor’s Certified Pavement marking Technician shall review this report with the Engineer (VDOT Inspector) on a daily basis. The Engineer (VDOT Inspector) shall sign the report after reviewing and confirming quantities. Pay quantities are confirmed from this report.
# PAVEMENT MARKING

**CONTRACTOR'S DAILY LOG AND QUALITY CONTROL REPORT**

**Contractor:** Street Kings Inc.  
**Date:** 7/9/11  
**Start Time:** 8:15 AM  
**Finish Time:** 6:30 PM  
**Job/Project No.:** 0045-074-726, N501  
**Sheet:** 1 of 1  
**Weather:** Partly Cloudy

**Air Temp. (Start):** 82°F  
**Air Temp. (Finish):** 96°F  
**Surface Temp. (Start):** 86°F

### *MATERIALS DOCUMENTATION:*

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<th>Certification Letter (Type/Date)</th>
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<td>CERT. 1</td>
<td>21742</td>
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<tr>
<td><strong>SNOW PELLET MARKERS</strong></td>
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<td>CERT. II LETTER DATED 5/21/11</td>
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### WORK COMPLETED:

<table>
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<tr>
<th>Type of Marking</th>
<th>Contract Item No.</th>
<th>Quantity</th>
<th>Units</th>
<th>Location/Description</th>
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### VTM - 94 TEST RESULTS

**Quality Control Measurements:**

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<th>Material Type</th>
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<td><strong>MOISTURE TEST (Plastic)</strong></td>
<td>PASS</td>
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*Material shipped under this certification has been tested and approved by VDOT as indicated by laboratory test numbers listed hereon.*

**Contractor Q. C. Technician:** William L. Smith  
**Date:** 7/9/11  
**VDOT Representative:** Robert T. Walker  
**Date:** 7/9/11

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**Copy District Traffic Engineer  
** ***Pay Quantity to be based on actual field measurement verified by the Engineer.**

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10-7
# PAVEMENT MARKING
## CONTRACTOR’S DAILY LOG AND QUALITY CONTROL REPORT

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<th>Contractor:</th>
<th>Date:</th>
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**Weather:**

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**MATERIALS DOCUMENTATION:**

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**WORK COMPLETED:**

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**Quality Control Measurements:**

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* Material shipped under this certification has been tested and approved by VDOT as indicated by laboratory test numbers listed hereon.

<table>
<thead>
<tr>
<th>Contractor Q. C. Technician</th>
<th>Date</th>
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<table>
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<th>VDOT Representative</th>
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Pay Quantity to be based on actual field measurement verified by the Engineer.

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Copy District Traffic Engineer District Materials Engineer
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TOTAL ITEMS IN SECTION 0001 | 2277565171 |

TOTAL BID | 2277565171 |
### ORDER NO.: G83
### CONTRACT ID. NO.: CM010PM6P96327

**SUMMARY OF ESTIMATED QUANTITIES FOR PM-6P-10**

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**STATE FORCES WORK __ PARTICIPATING __ NON-PARTICIPATING**

These items and quantities provided for estimating purposes only.
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 or VDOT Inspector
   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.
   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. 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

6. 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
7. 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

8. 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

9. 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.

10. Both the contractor and the inspector should constantly monitor the installation and quality of the material being placed.
    a) True
    b) False

11. 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

12. 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

13. 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
14. Before beginning work, the Source of Materials C-25 document is required to insure that under normal conditions:
   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

15. VDOT specifications require the Materials Inventory Tracking system to be maintained by the:
   a) Contractor
   b) Project Engineer
   c) Materials Section
   d) District Administrator

16. The contractor’s inventory is monitored by the:
   a) Central Office Materials Quality Assurance Section
   b) District Materials Engineer
   c) Resident Engineer

17. Copies of materials certifications are to be retained by the contractor as part of the Materials Inventory Tracking documentation.
   a) True
   b) False

18. When materials are delivered directly from the manufacturer to a VDOT project, the project inspector will contact:
   a) The Traffic Engineer
   b) Central Office Materials Quality Assurance Section
   c) The manufacturer
   d) The Resident Engineer

19. Contractor’s Daily Log and Quality Control Report (C-85) is required on Federal Projects only.
   a) True
   b) False