

Inspection

Construction Inspection

The Construction Inspector performs a vital service for the Virginia Department of Transportation (VDOT). Quality assurance can only be achieved when adequate inspection is performed at critical points in the construction process. The placement of asphalt concrete pavements is a high cost operation and when constructed correctly will provide a smooth durable riding surface that will last ten to twenty years. Pavement life depends on proper construction. Placement of the subbase, base material and paving materials, along with proper drainage all have an affect on the life of the riding surface. An improperly constructed asphalt concrete pavement will result in a shorter pavement life with increased maintenance and user costs.

A certain amount of commitment is required from VDOT personnel and the Contractor in order to obtain quality inspection and construction practices. VDOT personnel must be knowledgeable about paving practices and be able to provide timely decisions so that the Contractor's work is not delayed.

The Inspector and the Contractor need to be able to communicate effectively, and must have a common goal of end result construction being in conformance with the contract, plans, standards and specifications.

The Inspector must ensure the project plans and specifications are being followed. It is also important for the Contractor to provide competent personnel on the project and keep the Inspector informed of any scheduling changes that might affect the inspection process.



Material Acceptance

Sampling and Control of Asphalt Concrete

Asphalt concrete is composed of two components, aggregates and asphalt. Aggregates are classified into two groups, fine aggregates and coarse aggregates and are 90 to 95 percent of the weight of the asphalt concrete. The asphalt cement consists of a material in a semi-liquid state and makes up the remaining 5 to 10 percent of the weight of the asphalt cement. Aggregates are normally received



from an approved Producer. The aggregate Producer is responsible for sampling and controlling their product in accordance with the Materials Division Modified Acceptance Production Control Plan. Liquid asphalt materials are accepted under the VDOT Asphalt Acceptance Program (VAAP). This program involves sampling, testing, documentation and certification of the product by the Manufacturer.

Materials must be properly handled during the production of the asphalt concrete. A certified Asphalt Plant Technician must be on duty at the plant to insure that all materials used in the production of the asphalt concrete have been approved for use. The requirements for the production of asphalt concrete are found in Section 211 of the VDOT Road and Bridge Specifications.



The Producer is responsible for ensuring that all of his laboratory and operating equipment meet VDOT specifications.

Asphalt Concrete Mixtures

The Contractor is responsible for designing and submitting a job-mix formula that conforms to VDOT's mix design specifications. Once the Materials Engineer approves this job-mix formula the Contractor may use this job-mix on any VDOT project unless otherwise directed by the Engineer.

The following mix types are currently in use by VDOT and recommended depth per lift:

VDOT MIX TYPE COMPARISON AND APPLICATION RATES

Old Marshall Mix Designations	SUPERPAVE™ Mix Designations	Nominal Maximum Aggregate Size	Depth per Lift Min - Max	Normal Recommended Application Rate*
S3, S4, SM-1	SM-9.0	9.5 mm (3/8 inch)	3/4 - 1.25 inch (19 - 30 mm)	1 inch - 110 lb/yd ² (25 mm - 60 kg/m ²)
S5, SM-2	SM-9.5	9.5 mm (3/8 inch)	1.25 - 1.5 inch (30 - 40 mm)	1.5 inch - 165 lb/yd ² (40 mm - 90 kg/m ²)
SM-2	SM-12.5	12.5 mm (1/2 inch)	1.5 - 2.0 inch (40 - 50 mm)	1.75 inch - 185 lb/yd ² (45 mm - 90 kg/m ²)
SM-3	SMA-19.0	19.0 mm (3/4 inch)	2.0 - 3.0 inch (50 - 75 mm)	2 inch - 220 lb/yd ² (50 mm - 125 kg/m ²)
SMA- 9.5 (surface)	SMA-9.5 (surface)	9.5 mm (3/8 inch)	1.5 - 2.0 inch (40 - 50 mm)	1.25 inch - 138 lb/yd ² (31 mm - 75 kg/m ²)
SMA -12.5 (surface)	SMA-12.5 (surface)	12.5 mm (1/2 inch)	1.5 - 2.0 inch (40 - 50 mm)	1.50 inch - 160 lb/yd ² (37.5 mm - 90 kg/m ²)
SMA (intermediate)	SMA-19.0 (intermediate)	12.5 to 19.0 mm (1/2 to 1 inch)***	2.0 - 3.0 inch (50 - 75 mm)	2 inch - 220 lb/yd ² (50 mm - 125 kg/m ²)
IM-1	IM-19.0	19.0 (3/4 inch)	2.0 - 3.0 inch (50 - 75 mm)	2 inch - 220 lb/yd ² (50 mm - 125 kg/m ²)
BM-2	BM-25.0	25.0 mm (1 inch)	2.5 - 4.0 inch (60 - 100 mm)	3.0 inch** (75 mm)
BM-3	BM-37.5	37.5 mm (1.5 inch)	3.0 - 6.0 inch **** (75 -150 mm)	3.0 inch** (75 mm)

* Application rate is based upon 110 pounds per square yard per inch of thickness.

** Application rate for BM Type mixes should be determined from the actual specific gravity of the mixture as called for by the Materials Division or by region as indicated in the chart "Unit Weight of Base Asphalt Mixes for Approximate Quantity Calculations."

*** SMA Intermediate design criterion allows the mixture to meet the definition of either nominal maximum aggregate size.

**** Low density may result when placing a 6 inch(150 mm) lift. The maximum thickness shall be reduced if the mixture cannot be adequately placed in a single lift and compacted to required uniform density and smoothness. The Engineer may limit the maximum depth to 4 inch (100 mm) based on the ability to place and compact material.

Performance Graded (PG) Asphalt Binders are now being used on a nationwide basis. The first number of the PG grading indicates the high temperature stiffness of the asphalt, the higher the number and the stiffer the material. The lower number indicates the low temperature properties of the material³. Mix designations are based on traffic counts and percent of truck traffic on a pavement structure. An “A” designation is the most economical mixture to use with the “D” designation costing more and the “E” designation having significantly higher costs. A mix designation of “A” uses a PG 64-22 binder and is the most widely used of the PG binders. A “D” designation PG 70-22 is used on surfaces with high traffic loading situations the “E” designation PG 76-22 is used in extremely high traffic loading situations or where the pavement is subject to a high volume heavy traffic that is slow moving or turning. Examples would be high volume intersections or truck climbing lanes. Stiff mixes require higher temperatures and must be used with extra care during cool weather paving.

Quality Assurance Plan

The Contractor is responsible for the production and sampling of the asphalt concrete and is required to be under VDOT’s Quality Assurance Program. The asphalt concrete is accepted by a statistical analysis of the test results for aggregate gradation and asphalt cement content based on a 4000-ton lot of material. Samples will be randomly taken from each lot of material. Material that does not conform to the requirements for gradation and asphalt cement content will have a price adjustment applied to the bid price of the asphalt concrete. The Contractor also performs process control sampling and testing to verify the specified physical properties of the asphalt mixtures. (Section 502 of the Materials Division “Manual of Instructions”)

Road Sampling, Testing and Inspection of Asphalt Pavements

The Project Inspector will see that the Contractor follows the specifications and will notify the Resident Engineer of any misunderstandings, lack of cooperation, or any other situation that cannot be corrected by the Inspector. It is important for the Inspector to work with the Contractor so that maximum production is achieved while keeping with the plans and specifications. Operations should not be held up unnecessarily as continuous operations are important for uniform results.

Inspection Objective -

- Ensure cross-section of roadway constructed to specified elevations and template prior to application.
- Ensure existing surface is bonded to new course.
- Ensure proper density is obtained.
- Ensure pavement markings are placed in timeframe required.

Before beginning operations the Project Inspector must meet with the Resident Engineer and discuss details of the project such as:

- Determine where the work shall begin and end.
- Make certain the Contractor has a certified Asphalt Field Technician present during the entire paving operation where more than 100 tons of material is being placed in one location.
- Check grade and lift thickness and verify that proper density is being achieved during the rolling operations.
- Check all of the Contractor's paving equipment for compliance with specifications.
- Confirm and document that traffic control measures provide a safe work zone for the workers and the traveling public.
- Confirm type of mix and quantities of materials being placed. The Weighperson's Daily Summary Sheet - TL102A (see next page) is to be reconciled against the weigh tickets for that date. Any differences between the quantities shown on the Daily Summary Sheet and the weigh tickets are to be corrected by the Producer. Payment shall be denied for material delivered in excess of the legal load limit established for each truck.
- The Inspector shall make sure that the Materials Division has approved the asphalt prime/tack material and application rates for the prime/tack coat shall to be verified.
- The Project Inspector shall make a temperature measurement at the beginning of paving operations and every hour after the initial temperature check. When measurements are found to be outside of the temperature tolerances, a minimum of 3 additional measurements will be taken from different points of the load. The 4 readings will then be averaged and used as the temperature of the load or batch. All temperature measurements and the average shall be recorded.

**VIRGINIA DEPARTMENT OF TRANSPORTATION
WEIGHPERSON'S DAILY SUMMARY**

This is to certify that Black Top Paving Co. Deer Run
(Company Name) (Plant Location)

Shipped the following materials on the below referenced date.

Date: August 8, 2008

Project: PM07-002-228,N501

Route: 29

County: Albemarle

Type Material: SM-9.5D Rap - Quality Assurance

Job Mix ID: 2008-02

Lot Number: 2 - Modified Acceptance Program

No. Loads: 3

Total English Tons: 1102.07

Total Metric Tons: _____

Ricky Cole
(Bonded Weighmaster)

DEPARTMENT USE ONLY

Department's Verification

Date: 8/8/08

English Tons Received: 1,102.07

English Tons Deducted: 0.52

No. Loads Received: 60

Metric Tons Received: -

Metric Tons Deducted: -

Total Tons: 1,101.55

Reason for Differences:
Amount in excess of legal load limit

J.T. Miller
(Department Representative)

Eng. Tech. III
(Title)

Department representative has verified quantities and recorded pertinent information from the weigh tickets or certified delivery tickets.

Temperature Limitations

When the base temperature is between 35°F and 80°F, the Nomograph (Table III-2) shall be used. The minimum base and lay down temperatures shall not be less than the following:

PG Binder/Mix Designation	Percentage of Reclaimed Asphalt Pavement (RAP) Added to Mix	Minimum Base Temperature	Minimum Lay down Temperature
PG 64-22 (A)	<=20%	40°F	250°F
PG 64-22 (A)	>20%	50°F	270°F
PG 70-22 (D)	<=30%	50°F	270°F
PG 76-22 (E)	<=15%	50°F	290°F
PG 64-22 (S)	<=30%	50°F	290°F

Stone Matrix Asphalt (SMA) shall be placed only when the ambient and surface temperatures are 50°F or above. The mixture temperature in the truck shall not be less than 300 °F for mixtures containing PG 70-22 and 310 °F for mixtures containing PG 76-22.

As an Inspector it is important to be familiar with the VDOT Road and Bridge Specifications as well as Special Provisions that are found in the contract. Below is an exercise in looking up specifications.

All answers can be found in VDOT Road and Bridge Specifications Section 315 – Asphalt Concrete Pavement and Special Provisions.

Specification Practice

1. What section is equipment for asphalt concrete pavement found?

2. What is the equipment and application requirement for tacking joints? What section is this found in?

3. In section 315.05(d) the compacting sub-section of Procedures states, “Rolling shall not cause _____”.

4. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not be more than_____. This is found in Section _____.

5. How much should a longitudinal joint in one layer be offset from the layer immediately below? What section is this found in?

6. What is the pay unit for asphalt concrete material? This is found in what section?

INSPECTION
Study Questions

1. What are important qualifications for an Inspector?
 - A. Knowledge, common sense
 - B. Diplomacy, observation skills
 - C. All of the above

2. The most effective learning tool for an Inspector is on-the-job training.
 - A. True
 - B. False

3. What is the minimum placement temperature for PG-64-22 mix type A?
 - A. 375°F
 - B. 200°F
 - C. 250°F
 - D. 270°F

4. The Paving Inspector must keep a daily diary.
 - A. True
 - B. False

5. What is the purpose of inspection?
 - A. Control the quantity of work
 - B. Inspector to act as foreman for the Contractor
 - C. Ensure the quality of work
 - D. All of the above

INSPECTION
Study Questions (continued)

6. Each load arrives on the job site accompanied by a _____ .
- A. TL-52A
 - B. Weigh ticket
 - C. TL-102A
 - D. Daily diary
7. In order to accept asphalt concrete the Department must have:
- A. An approved mix design
 - B. A producer who is under VDOT's Quality Assurance Program
 - C. A good water source
 - D. Both A and B
8. It is important for an Inspector to have an understanding of what tests are required both on the road and at the plant.
- A. True
 - B. False