

HMA PAVEMENT TEXTURING SPECIFICATION

SECTION 02760

High Performance HMA Pavement Texturing System

PART 1 – GENERAL

1.1 DESCRIPTION

- A. HMA Pavement texturing is defined as a treatment of the surface of Hot Mixed Asphalt (HMA) pavement by imprinting stable, fully compacted HMA pavement with "grid style" or other styles of depressions to replicate, in relief, the concrete grout depressions common to hand-laid brick or cobblestone, or any other design as shown on the drawings or described in the specifications, and coating the imprinted pavement surface using a coating or system of coatings specifically formulated for HMA pavement.
- B. HMA Pavement texturing is highly suitable for virtually anywhere a decorative pavement solution is required. Paved entranceways, parking lots, residential driveways, sidewalks, plazas, medians, and cross-walks are some examples of successful applications of pavement texturing.
- C. Coatings used in the execution of HMA pavement texturing Work are highly specialized and designed to deliver a "balance of performance properties" unique for use on HMA pavement. HMA pavement coatings are only available from qualified pavement coating suppliers who can provide proof of the performance properties of their coatings. Minimum required performance properties are outlined in Section 2.2, Table 1 below.
- D. Metal wire rope templates are used to create the desired imprint pattern. Templates are available only from a qualified template supplier who has the ability to work with the Owner to design, develop and manufacture templates to match almost any pattern.
- E. A qualified HMA pavement coating supplier can provide their coatings in a variety of colors.
- F. A qualified HMA pavement coating supplier can provide coatings with an SRI greater than 29 and therefore qualify for the LEED program under Section SS Credit 7.1 Heat Island Effect: Non-Roof. Contact your qualified coating supplier for details.
- G. Only qualified applicators with experience in the application of HMA pavement texturing work are qualified to perform this work.

1.2 RELATED SECTIONS:

- A. Section 02230 Site Clearing
- B. Section 02330 Sub-grade and Roadbed Preparation
- C. Section 02720 Unbound flexible base courses
- D. Section 02740 Flexible Pavement

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1.3 REFERENCES

- A. ASTM D-4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester.
- B. ASTM D-4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrasion.
- C. ASTM D522-93A Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.
- D. ASTM G-155 QUV Accelerated Weathering Environment. Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
- E. ASTM D-2486 MEK rub test for chemical resistance.
- F. ASTM D-570 Standard Test Method for water absorption of plastics.
- G. ASTM E-303 British Pendulum test for friction.
- H. EPA 24 ASTM D3960-05 Volatile Organic Compounds.

1.4 DEFINITIONS

- A. **“HMA pavement”** is Hot Mix Asphalt pavement.
- B. **“Qualified Applicator”** is a contractor or applicator who has completed HMA pavement texturing work and can provide references upon request.
- C. **“Owner”** means the Owner and refers to the representative person who has decision making authority for the Work.
- D. **“Imprinting HMA pavement”** is defined as pressing flexible metal templates into fully compacted, heated HMA pavement to create the appearance of grout lines or patterns in the HMA pavement surface.
- E. **“Textured HMA Pavement”** is HMA pavement that has been subjected to imprinting or stamping in a specific pattern.
- F. **“Non-textured HMA pavement”** is HMA pavement that is unstamped and is sometimes referred to as “flatwork”.
- G. **“Scuffing”** of HMA pavement is a “tear” of the HMA pavement caused by an external force. Stationary vehicle tires turning on the pavement surface is a typical cause.

1.5 SUBMITTALS

Submittals to be made available to the Owner upon request are as follows:

- A. HMA pavement mix design.
- B. Proof in a form suitable to the Owner of contractor ability to install HMA pavement texturing.
- C. ASTM Properties and test results of the coating materials.
- D. Confirmation of coating color(s).

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PART 2 – PRODUCTS

2.1 MATERIALS – COATINGS

Properly designed HMA pavement coatings have been scientifically formulated to provide the optimal balance of performance properties for a durable, long lasting color and texture to HMA pavement surfaces. Some of these key properties include wear and crack resistance, color retention, adhesion, minimal water absorption and increased friction properties. As well, the HMA pavement coating must be environmentally safe and meet EPA requirements for Volatile Organic Compounds (VOC).

2.2 MINIMUM PERFORMANCE PROPERTIES OF HMA COATING:

The following table outlines the minimum required performance properties of the HMA pavement surface coating. These performance properties must be ascertained by a Certificate of Analysis issued by an approved testing facility.

TABLE 1: Required Performance Properties of HMA Pavement Coating

Characteristic	Test Specification	Measured result
Durability: Taber Abrasion resistance	ASTM D-4060 1 day cure, H-10 wheel: cycles (dry)	<1.5 g/1000
Water sensitivity	ASTM D570 Water absorption after 9 days: Remaining absorption after 1 hour of recovery:	<10%
		< 1.0%
Color stability	ASTM G-155 QUV 2,000 hours (CIE units)	Brick color $\Delta E < 1.5$
Flexibility: Mandrel Bend	ASTM D522-93A Flexibility as measured by Mandrel bend 0.5mm thick sample passes 10 mm at 21°C 0.5mm thick sample passes 125mm at -18°C	
Chemical resistance	ASTM D-2486 Modified MEK scrubs 16 dry mils, number of scrubs until 50% substrate exposed	>5000
Adhesion to Asphalt	ASTM D-4541	Substrate Failure
Friction Wet	ASTM E-303 British Pendulum Tester	>55
Environmental Sensitivity	EPA 24 ASTM D3960-05 Volatile Organic Compounds	VOC < 150

2.3 EQUIPMENT

The following equipment is to be used in the execution of the Work.

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- A. Metal templates manufactured from flexible, woven wire rope cut and welded into the patterns as detailed on the drawings, and used for imprinting HMA pavement.
- B. Only equipment that is specifically designed for the re-heating of HMA pavement may be used in the execution of this work. Re-heat equipment must be designed to gently elevate the temperature of the HMA pavement without adversely affecting it. Re-heat equipment must also allow the operator to monitor the temperature of the HMA pavement at all times during the heating process.
- C. Coating spray equipment must be used in the application of the coating and must be capable of applying the coating to the HMA pavement surface in a thin, controlled film which will optimize the drying and curing time of the coating.
- D. Vibratory Plate Compactors shall be used for pressing the wire templates into the heated asphalt to create the specified pattern.

PART 3 - EXECUTION

3.1 GENERAL

The pavement texturing system shall be supplied and installed by a Qualified Applicator in accordance with the plans and specifications or as directed by the Owner. Do not begin installation without confirmation of Applicator certification.

3.2 PRE-CONDITIONS - PAVEMENT

A high quality, highly stable HMA pavement is a pre-requisite for the installation of the pavement texturing system.

This Section 3.2 is to be used as a guide towards achieving a high quality HMA pavement. It does not supersede other specifications pertaining to this Work, nor does it replace recommendations made by the engineer of record for this Work.

3.2.1 Pre-requisites for new HMA pavement:

- Stable sub-grade or base over which the HMA concrete is laid.
- Proper mix design.
- Proper placement and compaction practices.

3.2.1.1 Sub-grade: The sub-grade must be stable and should be inspected to identify any areas of soft or yielding soil that are too weak to properly support the paving equipment. These soft spots must be over-excavated and re-compacted to meet the engineer's requirements. Prior to paving, the sub-grade and base courses must be thoroughly and uniformly compacted, properly graded and constructed in accordance with the engineer's specifications. Please refer to the related sections for more exact requirements of this work.

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3.2.1.2 Guidelines for HMA pavement mix design.

A durable, stable mix design is a pre-requisite for all long-lasting HMA pavement surfaces, especially those that will experience vehicle traffic. The application of a pavement texturing system does not change this requirement. **Generally, the HMA pavement mix design for roadways as prescribed by the local jurisdiction will be sufficient for the application of the pavement texturing system.** Failure to use a stable mix design may lead to premature failure of the HMA pavement such as raveling, rutting or segregation. The appropriate pavement structure is not within the scope of this specification; however, this specification can offer some general guidelines as follows:

- A. Stability** is a good general guide: generally, if the surface course design has a minimum Marshall Stability of 10 KN (about 2250 lbs) and design densities are achieved during compaction, the pavement should perform adequately.
- B.** The mix design should include a **nominal maximum aggregate size** of 12.5mm (1/2"). For clarity, SuperPave defines **nominal maximum aggregate size** as "one sieve size larger than the first sieve to retain more than 10 percent of the material".
- C.** For locations that will not experience any vehicle traffic, a more "tender" mix design can be used.

3.2.1.3 Placement of New HMA Pavement

- A.** Successful placement of HMA pavement includes compacting the mix when it is hot and compacting the mix to achieve the specified air voids. Generally, the first pass of the rollers is to be done when the asphalt mixture is at minimum 230°F (110°C); the compaction process must be **completed** before the **in-place** temperature of the mixture cools to 185°F (85°C) or higher depending on the type of asphalt and/or modifiers used. For applications that will experience vehicle traffic and wherever it is possible, compaction is to be completed using a paving machine and a self-propelled roller.
- B. Handwork**, which includes placing and spreading by hand and the use of hand operated compaction equipment, should be restricted to areas that cannot be accessed by the paving machine or the self propelled rollers. Compaction must be completed when the pavement is hot as described above. Handwork is to be done carefully and the material distributed uniformly so there will be no segregation.
- C.** The pavement must be smooth, without seams and graded to achieve proper drainage.
- D.** Note that additional compaction will not be achieved through the application of the pavement texturing process.

3.2.2 Pre-requisites for existing HMA pavement.

Depending upon the condition and age, existing HMA pavement may or may not be suitable for the successful application of HMA pavement texturing. The Qualified Applicator can advise whether the HMA pavement is suitable or not.

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The Owner shall make the final determination as to the suitability of the existing HMA pavement.

3.2.3 Mill & Fill: recommended guidelines.

A tack coat must be applied to ensure proper adhesion of the new HMA material to the old pavement substrate. A durable, stable mix design is a pre-requisite for all Mill & Fill applications - especially those that will experience vehicle traffic. The application of the HMA pavement texturing process does not change this requirement. A Minimum lift thickness of two inches is recommended. Due to the thin lift thickness placed over a cool substrate, it is especially critical to ensure that the HMA concrete is hot when it is delivered, installed and compacted. It is generally recommended to not proceed with a Mill & Fill pavement application when the outside air temperature is less than 50°F (10°C).

3.2.4 Pavement Marking Removal

Pavement markings may be removed by sandblasting, water-blasting, grinding, or other approved mechanical methods. The removal methods should, to the fullest extent possible, cause no significant damage to the pavement surface. The Owner shall determine if the removal of the markings is satisfactory for the application of the HMA pavement coating. Work shall not proceed until this approval is granted.

3.3 LAYOUT

Layout of the pattern for imprinting into the surface of the HMA pavement shall be as per the drawings and specifications and in accordance to the methods prescribed by the applicator in conjunction with the Owner.

3.4 HEATING THE HMA PAVEMENT

The Applicator shall follow the guideline provided by the qualified equipment supplier for re-heating HMA pavement.

- A.** The pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.
- B. Pavement temperature.** The optimal pavement temperature for imprinting the template is dependent upon mix design, modifiers used in the mix, the age of the pavement and weather. The surface temperature of the pavement should not exceed 325°F as determined by an infra-red thermometer reading taken after the heat is applied to the HMA pavement.
- C.** In order to achieve the proper depth of imprint it is important to elevate the HMA pavement temperature to a minimum depth of 1/2 inch (12.5mm) without burning the pavement surface.

3.5 SURFACE IMPRINTING

- A.** The pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.

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- B.** Only approved HMA pavement re-heat equipment shall be used to elevate the temperature of the HMA pavement.
- C.** Once the HMA pavement has reached imprinting temperature, the templates shall be placed in position and pressed into the surface using vibratory plate compactors. The top of the template is to be flush with the surrounding HMA pavement and can then be removed. Areas that have an imprint depth less than 3/8 inch shall be re-heated and re-stamped prior to applying the coatings. Hand tooling is a permitted method to achieve proper imprint depth in areas difficult to get at with the template.

3.6 APPLICATION OF HMA PAVEMENT COATING

3.6.1 Application Guidelines.

- A.** The qualified applicator shall refer to the HMA pavement coating supplier's recommendations for methods of application. Special care and attention must be paid to ensure HMA pavement coatings are applied in environmental conditions that permit proper cure.
- B.** The pavement surface shall be completely dry and thoroughly cleaned prior to application of the HMA pavement coating(s).
- C.** Depending upon the condition and age of the pre-existing pavement, primer may be required. Refer to the HMA pavement coating supplier's specifications.
- D.** The coating application shall proceed as soon as practical upon completion of the imprinting of the HMA pavement.
- E.** The qualified applicator shall use spray equipment specifically designed for the application of the coating(s).
- F.** Refer to the HMA pavement coating supplier's recommendations for coating coverage rate, number of recommended passes and recommended thickness.

3.7 OPENING TO TRAFFIC

Minimally, the surface coating must be 100% dry before traffic is permitted. Refer to the qualified pavement coating supplier's guide.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

The measured area is the actual area that has received the HMA pavement texturing. No deduction will be made for the area(s) occupied by manholes, inlets, drainage structures, bollards or by any public utility appurtenances within the area.

4.2 PAYMENT

Payment will be full compensation for all work completed as per conditions set out in the contract. For unit price contracts, the payment shall be calculated using the measured area as determined above.