

SECTION 321223 DURATHERM® – DECORATIVE INLAID ASPHALT PAVEMENT MARKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

1. Section [321216] - "Asphalt Paving" for new asphalt pavement.
2. Section {321723} – Plastic Pavement Markings

1.3 SUMMARY

- A. Decorative inlaid asphalt shall consist of a durable inlaid aggregate reinforced preformed thermoplastic pavement marking system (herein “System”) that provides a textured, aesthetically attractive and durable topical treatment to the surface of the asphalt pavement.
- B. The System is intended for use on asphalt pavements to create traffic calming solutions for decorative crosswalks, medians, courtyards, roundabouts, and intersections. It is applied to pavement to create functional decorative crosswalks and intersections, as shown on the Contract Drawings.
- C. All System materials shall be produced under a quality system as specified in this section and designed to provide durability, load carrying capacity and architectural compatibility with the location. All raw materials shall be graded for consistency and quality to obtain the required standards.
- D. The System shall be installed to the existing asphalt substrate.
- E. Only accredited decorative inlaid asphalt system installers authorized by the applicable manufacturers of the decorative inlaid asphalt product may perform this work.

1.4 UNIT PRICES

- A. Work under Section is based on labor and materials per project.

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- B. Method of Measurement: The work will be measured by the installed area of square feet, measured and accepted in place. 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.
- C. Basis of Payment: This work will be paid for at the Contract unit price per square foot for “Decorative Inlaid Asphalt Pavement Marking” and accepted in place. Price shall include all materials, equipment, tools and labor incidental thereto. There will be no separate payment for surface preparation; but the cost of this work shall be considered as included in the general cost of the work.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **Project site (Insert location)**.
- B. Conference shall consist of **Owner, Owners Representative, Engineer, Landscape Architect, Accredited Installer, manufacturer’s representative**.

1.6 DEFINITIONS

- A. “HMA pavement” is Hot Mix Asphalt pavement.
- B. “PCC pavement” is Portland Cement Concrete pavement.
- C. “Owner” means the Owner and refers to the representative person of the Owner who has decision making authority for the Work.
- D. “Accredited Installer” refers to a contractor authorized by the System manufacturer to install the decorative inlaid asphalt (system).

1.7 SUBMITTALS

- A. Product Data: For each type of product per manufacturer’s offering.
- B. Manufacturer Data: System type and product type
- C. Samples for Initial Selection: For each type of product requiring color selection.
Samples for Verification: For each pattern and color in manufacturer's standard sizes.
- D. The Accredited Installer shall provide written proof of their accreditation.
- E. The Accredited Installer shall gain confirmation of correct stamping pattern(s) and colors from the [**Owner, Owners Representative, Engineer, Landscape Architect**] prior to starting the Work.

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- F. The Accredited Installer shall supply three references of work of a similar nature provided to a **[Owner, Owners Representative, Engineer, Landscape Architect]** <insert other> within the State of <insert state>.
- G. Construction of mock-up (shall be a minimum of a 6’x6’ section for each color and stamp pattern specified).
- H. The System manufacturer must be ISO 9001:2015 certified for design, development and manufacturing of preformed thermoplastic, and provide proof of current certification.
- I. Shop Drawings:
Indicate inlaid patterns, colors, and dimensions to adjacent work

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Accredited Installer required for this Project.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of <Insert applicable standards> of <Insert name of state or local DOT> for inlaid asphalt work.
 - 1. **Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.**

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with inlaid pavement system only when air temperature is at least **40 deg F (4.4 deg C)** and rising. Proceed only if no precipitation is expected. Ensure there is no moisture in the substrate prior to application. Surface should not have any frost or moisture present. High winds could also affect the installation of the impressed material.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manufacturer -
Basis of Design – Ennis-Flint, Inc. TrafficScapes® - Duratherm® inlaid surface system
1. Contact www.ennisflintamericas.com
- B. DECORATIVE INLAID ASPHALT MATERIAL

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1. **Preformed Thermoplastic Material:** Must be composed of an ester modified rosin impervious to degradation by motor fuels, and lubricants in conjunction with aggregates, pigments, binders, and anti-skid/anti-slip elements. Pigments and anti-skid/anti-slip elements must be uniformly distributed throughout the material. The material conforms to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state, being non-reflective, and potentially being of a color different from white or yellow.
2. The System shall utilize a resilient, aggregate reinforced preformed thermoplastic product which contains a minimum of thirty percent (30%) intermixed anti-skid/anti-slip elements and where the top surface contains anti- skid/anti-slip elements. The intermixed anti-skid/anti-slip elements must have a minimum hardness of 6 (Mohs scale). The manufacturing drop-on for the top surface must have intermixed anti-skid/anti-slip elements with a minimum hardness of 8 (Mohs scale).
3. The System must be resistant to the detrimental effects of motor fuels, antifreeze, lubricants, and hydraulic fluids.
4. **Pigments:**
 - a. **White:** The material shall be manufactured with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected.
 - b. **Other Colors:** The pigment system must not contain heavy metals nor any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.
5. **Skid Resistance:** The surface of the material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.
6. **Slip Resistance:** The surface of the material shall contain factory applied anti-skid/anti-slip elements with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum static friction of coefficient of 0.6 when tested according to ASTM C 1028 (wet and dry), and a minimum static coefficient of friction of 0.6 when tested according to ASTM D 2047.
7. **Thickness:** The material must be supplied at a minimum thickness of 90 mil (2.3mm).
8. **Environmental Resistance:** The material must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

C. **DECORATIVE INLAID ASPHALT MATERIAL STAMPING TEMPLATE:** A plastic template is required in the execution of the System. The template is used after the pre-heating of the asphalt surface and impressing the defined patterns prior to the preformed thermoplastic application. The

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plastic templates are distributed by the System manufacturer. Standard patterned templates are designed to create crosswalks ranging from 6 ft. (1.8 m) to 20 ft. (6.1 m) wide, in 2 ft. (.6 m) width increments. Template layout drawings shall be supplied by the inlaid system manufacturer to illustrate proper template placement to create the specified pattern. Certain templates may be field assembled as needed using the manufacturer supplied template assembly kit. For crosswalk widths less than 6 ft. (1.8 m) or more than 20 ft. (6.1 m), custom templates may be designed and constructed in 2 ft. (.6 m) width increments.

- D. Hand-Held Finishing Tool: Enables the Accredited Installer to complete the imprinting of the asphalt pavement in areas around permanent structures, such as curbs and manholes covers, which may be inaccessible to the stamping template. The hand-held finishing tools are distributed by the inlaid System manufacturer.
- E. Vibratory Plate Compactor (700-900 lb. / 318-408 kg): Shall be used for pressing the stamping template into the heated asphalt to create the specified pattern. The inlaid System manufacturer does not supply vibratory plate compactors.
- F. HEATING EQUIPMENT: System-specific reciprocating infrared heating equipment is designed specifically to elevate the temperature of the preformed thermoplastic material and asphalt pavement without adversely affecting it. The primary heating unit must employ a bank of propane-fired infrared heaters, mounted on a track device that allows the heater bank to reciprocate back and forth over a designated area, thereby allowing the operator to monitor the temperature of the preformed thermoplastic at all times during the pavement heating process.

A smaller, mobile infrared heater is designed specifically to heat areas such as borders and narrow areas that are inaccessible to the primary heaters. This secondary heater also allows the operator to monitor the temperature of the preformed thermoplastic at all times during the heating process.

An approved hand-held propane heat torch distributed by the inlaid System manufacturer shall be used to heat isolated areas of the asphalt pavement or inlaid preformed thermoplastic.

- G. MATERIALS AGGREGATE: Supplemental anti-skid/anti-slip elements to be applied to the surface of the molten preformed thermoplastic as needed, if the factory applied anti-skid/anti-slip elements embed too deeply into the surface of the molten preformed thermoplastic material during the heating process. (Embedded aggregate is exposed upon wear for extended skid resistance.) The aggregate is distributed by the System manufacturer.

H. PATTERNS & COLORS

- 1. Patterns and colors are described below:
 - a. Decorative inlaid asphalt - **Type A <insert use and/or location on drawings>**
Pattern: insert pattern design or custom>
Color: (Standard/Premium) <insert color>
 - b. **<insert other color or design if required>**

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2. Contractor shall verify all colors and patterns with owner's representative prior to placement.
- I. **SHELF LIFE AND STORAGE** The shelf life of decorative inlaid asphalt materials is two years provided it is protected from the weather, specifically UV degradation and rain. The materials are to be stored in their original packaging and kept dry under cover and or as per manufacturer's specifications

PART 3- EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin the impressing process according to manufacturer's written instructions.
- B. Proceed with asphalt impressing only after unsatisfactory conditions have been corrected.
- C. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of impressed asphalt.

3.2 INLAID ASPHALT

- A. **General:** Inlaid asphalt according to manufacturer's written instructions, using manufacturer's recommended equipment.
- B. **PRE-CONDITIONS:** Decorative inlaid asphalt shall be installed over new or existing pavement. The pavement must be firm, stable and in excellent condition; it must be free from defects such as cracks, settlement, visible seams, ruts, bird baths and spalling.
 1. Cracking, settlement and other deficiencies of the substrate will likely reflect through the decorative preformed thermoplastic. Good and proper construction procedures for the installation of the substrate must be followed in order to mitigate cracking of decorative preformed thermoplastic.
 2. Surfaces with a high degree of porosity should be avoided due to the problems associated with entrapped water.
 3. Surfaces that may be subject to uncontrolled movement in either a horizontal or vertical direction shall be avoided as there may be a risk of reflective cracking through to the decorative preformed thermoplastic. Notify the engineer if these conditions are present before installing decorative preformed thermoplastic.
- D. **PREPARING OF THE SUBSTRATE:** All pavement substrates must be of high quality and stable for the installation of decorative inlaid asphalt System.

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This Section is to be used as a guide to ensure a high-quality pavement substrate is provided and ready for the installation of the decorative System. It does not supersede other specifications pertaining to this Work, nor does it replace recommendations made by the engineer of record for this Work.

1. The base and sub-grade over which new pavement is installed must be firm and stable.
 2. The pavement mix must be designed for the intended use.
 3. The pavement must be installed in accordance with proper placement practices and these specifications.
 4. The asphalt pavement must be permitted to cure properly before installing decorative impressed asphalt System.
- E. **SURFACE PREPARATION:** The pavement surface shall be dry and clean: free of all dirt, debris, salts, concrete admixtures and any chemical residues.
1. Bituminous residue must be removed from new asphalt pavement surface prior to installation of decorative inlaid asphalt System.
 2. Removal of contaminants may be done by brooming, compressed air, pressure washing (moisture must be removed and the surface dry as noted above) or, if necessary, light-grit blasting. Wire brush may be used to remove loose or powdery materials.
- F. **INSTALLATION OF DECORATIVE INLAID ASPHALT:** Decorative impressed asphalt System is to be installed only by an Accredited Installer.
1. The System must be able to be applied to asphalt surfaces with pre-heating the application surface to a specific temperature.
 2. The System is applied to asphalt pavement primarily using reciprocating infrared heating equipment. An approved hand-held propane heat torch distributed by the System manufacturer shall be used to heat isolated areas of the preformed thermoplastic.
 3. Specialized handheld finishing tools, aggregate and vibratory plate compactors are used as part of the installation process
 4. The aggregate reinforced preformed thermoplastic is typically supplied in panels measuring 2 ft. x 2 ft. [$\pm\frac{1}{8}$ in.] (.61m x .61m [± 3 mm]).
 5. The System is available in a variety of standard colors and patterns. Color can be used to create patterns within the crosswalk area to reflect the typical white crosswalk for additional visibility and awareness.
 6. The material must be able to be applied at ambient and road temperatures with a minimum temperature of 40°F (4.4°C) and rising.
 7. The substrate is pre-heated to the required temperature prior to stamping the Duratherm decorative inlaid asphalt template The Duratherm template is stamped using a vibratory plate compactor, the templates are removed from the asphalt surface, and the Duratherm preformed inlaid thermoplastic material is placed in the area where the stamping took place and positioned properly on the asphalt substrate with the aggregate side facing up. The preformed thermoplastic is then heated to the required melting temperature. Additional aggregate may be applied to the preformed thermoplastic surface as needed following the melting process.

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8. The preformed thermoplastic material is then allowed to cool thoroughly before being opened to vehicle or pedestrian traffic. (Consult the manufacturer's published application procedures for complete information.) The timing of opening traffic will be subject to exterior temperature conditions. More time may be required in hot weather. The Accredited Installer can advise when the work is ready for traffic.
9. Install Premark® White 125mil preformed thermoplastic material with glass beads as the transverse lines on the outside areas of the installed Duratherm® marking system as required to meet MUTCD requirements.
10. Duratherm inlaid surface system may not be applied to Portland concrete cement surfaces.

G. PACKAGING:

1. The Duratherm® preformed thermoplastic material shall be packaged in cardboard cartons with a plastic sheet between each layer of preformed thermoplastic. The cartons in which the Duratherm marking system is packed shall be non-returnable and shall not exceed 25 in. (.64m) in length and 25 in. (.64m) in width. The cartons shall be labeled for ease of identification. The weight of the individual carton must not exceed seventy (70) pounds (32 kg). A protective film around the carton must be applied to protect the Duratherm preformed thermoplastic material from rain or premature aging.

H. TECHNICAL SERVICES:

The successful bidder shall provide technical services as required.

END OF SECTION 321223 DT

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