City of Cambridge
PURCHASING DEPARTMENT

Elizabeth Unger
Purchasing Agent

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Assistant Purchasing Agent for
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TO: **All Bidders**

FROM: **City of Cambridge**

DATE: **February 22, 2024**

RE: **11391 - Preformed Thermoplastic Bicycle Markings**

This addendum is comprised of:

Submitted Questions and Answers

SUBMITTED QUESTIONS AND ANSWERS:

Q1: Can you supply a specification for the preformed thermoplastic material requested?

A1: Please see the below attached specification document.

Q2: What mil thickness do you want line items 1-13 supplied?

A2: 90 mil.

Q3: Does the City use a primer or sealer with preformed thermoplastic when suggested for certain surface applications?

A3: All items with a background (see the "Color" column) should include primer/sealer.

Q4: Does the delivery of this material require an "inside" delivery with no assistance from City personnel or will deliveries be unloaded by the City if the LTL carrier has a liftgate?

A4: The vendor will receive no assistance from Cambridge Traffic Department personnel when delivering and unloading materials.

Q5: How does the Truck Safety Regulation relate to this bid for supplying preformed thermoplastic?

A5: All trucks used for the delivery of materials relevant to this bid will be subject to the Truck Safety Ordinance.

Q6: Are bid tabs available from the 2023 Bid?

A6: Please see the below attached bid tabulation.

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Q7: What is the purchase value from the contract in 2023?

A7: $61,650.12

Q8: Do you have a drawing for line number 7?

A8: See the below image

Addendum No. 1

PREFORMED THERMOPLASTIC PAVEMENT MARKINGS
(adapted from PREFORM_SPECS_073118_V6.060521.pdf)

1. **Description**: This specification is for a preformed polymer thermoplastic pavement marking material, which is adhered to asphalt and concrete pavements and Portland cement concrete pavements by means of heat fusion/adhesion using a propane torch.

1.1. These markings are suitable to use for roadway, intersection, commercial or private pavement delineation and markings.

1.2. The markings shall be designed for straight lines, arrows, symbols, legends, letters/numbers, and specialty markings.

1.3. The markings are designed for high urban traffic volumes and severe wear and will not deteriorate due to exposure to sunlight, oil and gasoline, water, salt, or pavement oil content.

1.4. The preformed marking shall conform to the pavement contours. The marking shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and alkyd thermoplastic.

1.5. Configurations shall conform to the current Manual of Uniform Traffic Control Devices for Street and highways as issued by the U.S.A. Federal Highway Administration.

1.6. The markings must be a resilient white or colored thermoplastic product with uniformly distributed glass beads on the surface and throughout the entire cross section of the material.

2. **Quality Control**: Must have a quality control plan in place and good manufacturing practices (GMP).

3. **Material Composition**: The material is comprised of alkyd modified ester rosin that will not be deteriorated by gas or oil. In addition, the material contains aggregates, pigments, binders, and glass beads which have been factory produced as a finished product. The thermoplastic material shall conform or exceed AASHTO designation M249, except for the relevant differences due to the material being supplied in a preformed state.

3.1. **Glass Beads:** The preformed thermoplastic material shall have a minimum of 30% uniformly distributed glass beads throughout the entire cross section of the material. The exposed layer of glass beads shall provide immediate retro-reflectivity without additional glass beads being added on the material during application.

3.1.1. The intermixed beads shall be clear and transparent, and no more than twenty percent (20%) shall consist of irregular fused spheroids, or silica. The index of refraction shall not be less than 1.50.

3.1.2. The material must have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq.ft. These factories applied surface beads shall have the following specifications:

3.1.3. 1) Minimum 80% rounds
2) Minimum refractive index of 1.5
3) Minimum SiO2 content of 70%
4) Maximum iron content of 0.1%

Size Gradation		Retained, %	Passing, %
US Mesh	Um		
12	1700	0 – 2%	98 – 100%
14	1400	0 – 6%	94 – 100%
16	1180	1 – 21%	79 – 99%
18	1000	28 – 62%	38 – 72%
20	850	62 – 71%	29 – 38%
30	600	67 – 77%	23 – 33%
50	300	86 – 95%	5 – 14%
80	200	97-100%	0 – 3%

3.2. Pigments:

3.2.1. White: The material shall be manufactured with 10% rutile titanium dioxide pigment meeting ASTM D-476 Type II, or as stated by state specifications.

3.2.2. Yellow, Blue, and Red: The material shall be manufactured with sufficient and Ultraviolet stable pigments. The yellow pigments must be organic and must be heavy-metal free.

3.2.3. Other Colors: The pigments must be heavy-metal free.

3.3. Melting Index:

3.3.1. The top surface of the material should be heated until the material has reached a molten state (fusible liquid).

3.3.1.1. Material will appear to be shiny.
3.3.1.2. The edges will relax and slant downward.
3.3.1.3. Small bubbles and/or steam can be visible.
3.3.1.4. Material is completely conformed to surface being applied to.
3.3.1.5. During normal application, the material shall not mar or discolor and/or turn brown.

All the above signify that a satisfactory adhesion and proper bead embedment has been achieved.

3.4. The top side of the material, where the top beads are located, shall have factory applied heat indicators to assist the applicator in determining when the material has reached its molten state.

4. **Skid Resistance:** The surface of the material, with properly applied and embedded top dressing, must provide a minimum skid resistance value of 45 BPN when tested according to ASTM: E 303.

5. **Thickness:** The width of the supplied material shall have a minimum average thickness of 90 mil (2.286mm).

6. **Environmental Wear and Tear:** The material is resistant to deterioration, exposure to water, sunlight, adverse weather conditions and is impervious to oil and gasoline.

7. **Retro-reflectivity:** The preformed markings shall, upon application, exhibit uniform adequate nighttime reflectivity using a retro reflectometer with a 30-meter geometry and tested in accordance with ASTM E 1710. The preformed thermoplastic shall be capable of exceeding a retro-reflectivity value of 450 millicandelas for white and 250 millicandelas for yellow. Note: the retro reflection can vary greatly during installation depending on the amount of heat applied during installation. In colder temperatures, more heat is required for proper installation and may affect initial retro-reflection levels. Retro-reflectivity of the material will increase days/months after initial installation. Broadcasting beads during or after application shall be permitted providing it meets all requirements. The best practice is to remove excess beads to reduce shadowing.

8. **Installation:** Prior to application PREFORM shall remain flexible at temperatures above 40°F and shall be fusible to asphalt or concrete by means of the normal heat of a propane type torch. In addition, the preformed thermoplastic material must be capable of being handled without breaking in temperatures as low as 40ºF (0ºC).

   8.1. The type of torch shall be recommended by the manufacturer and have a rating between 210,000 and 600,000 BTU's.
   8.2. PREFORM shall be applied in accordance with the manufacturer's recommendations. All moisture must be completely removed from the substrate and the surface must be totally free of loose or chipping debris.
   8.3. A primer is recommended for aged or difficult to bond surfaces like smooth, non-porous concrete.

9. **New Surfaces:** On most surfaces, markings shall be capable of being applied as the original permanent marking on the day the surface is paved without being adversely affected by the fresh pavement oil content. If excessive oil is present on top, it should be removed. If unsure,

please contact your technical sales representative to acquire further guidance on specific pavement types.

10. **Packaging**: The material shall be packaged in suitable cartons clearly labeled with items such as material thickness, batch #, part #, etc., for ease of identifying the contents.
    - **10.1.** Cardboard stiffeners are to be placed in boxes where necessary.
    - **10.2.** Each pallet is stretch wrapped and banded in both directions to avoid shifting during transit.
    - **10.3.** The packaging shall be packed in 100% recycled materials.
    - **10.4.** Maximum of 3’ long pieces for linear material.
    - **10.5.** The carton shall not weigh more than 70 lbs.
    - **10.6.** Intricate markings shall be skin packaged to reduce possible shipping damages.

11. **Technical Services:** In the event technical assistance is needed, provide a number or contact for assistance.

File No. 10805 Date: 2/23/2023	Preformed Thermoplastic Bicycle Markings	
Ennis-Flint, Inc.	$61,650.12	AWARDED
Gentem Inc.	$101,668.00	