REFLECTIVE SHEETING MGS 93-03J

1.0 DESCRIPTION. This specification covers reflective sheeting for highway signing.

1.1 Unless otherwise stated, the specification references and test methods are from the latest version in effect at the time of this order.

2.0 MATERIALS.

2.1 General. Reflective sheeting shall be in accordance with Missouri Standard Specification for Highway Construction, Section 1042 and shall have a pre-coated pressure sensitive adhesive that shall not require additional adhesive coats on the reflective sheeting or application surface. The protective liner attached to the adhesive shall be a clear, moisture-resistant liner, which shall be easily removed by peeling without soaking in water or other solvents

2.1.1 The adhesive shall form a durable bond to unpainted corrosion-proof surfaces such as galvanized steel, chromate treated aluminum, or reclaimed aluminum and shall adhere securely under all atmospheric conditions of field exposure. The adhesive bond shall be sufficient to render the applied sheeting vandal-resistant and prevent its shocking off when struck by foreign objects.

2.1.2 Reflective sheeting applied to cleaned aluminum test panels shall adhere securely within 48 hours, at temperatures of -20 F to 150 F. Aluminum is reclaimed by sanding or high-pressure water process with no further treatment.

2.1.3 Type 1 and Type 3 reflective sheeting shall be furnished in 100-yard rolls with no more than 5 rolled overlap splices per roll. Rolled overlap splices shall be 3/16" ± 1/16" in length. Butt splices shall not be allowed. All rolls of 12 ¾" wide sheeting shall be a nominal 12 ¾". All others widths shall be 3/16" wider than the nominal width.

2.1.4 Type 7 and fluorescent sheeting shall be furnished in 100-yard rolls with no more than one butt splice per roll. Overlap splices shall not be allowed. All rolls of Type 7 and fluorescent reflective sheeting shall be 3/16" wider than the nominal width.

2.1.5 Vinyl films shall have a clear, moisture-resistant liner attached to the adhesive, which shall be easily removed by peeling without soaking in water or other solvents.

2.2 All materials supplied shall comply with current U.S. Environmental Protection Agency regulations during the period of the awarded contract and any extensions. Should any material become non-compliant during these periods, it shall be the responsibility of the supplier to accept returned materials and accept any expenses incurred for disposal of such material.

3.0 MANUFACTURER AND BRAND NAME APPROVAL.

3.1 Prior to approval and use of the materials, the manufacturer shall submit to the State Construction and Materials Engineer, NTPEP two year test results from all test decks and certification that the materials meet the requirements of this specification, showing specific test results. In addition, the manufacturer shall submit to the State Construction and Materials Engineer, samples representing the reflective sheeting tested by NTPEP and inks. These samples shall be accompanied by a product data sheet, a material safety data sheet, technical bulletins on sign fabrication and any special fabrication instructions relative to the reflective

sheeting being submitted. Samples of reflective sheeting shall be a minimum of 13 inches by 13 inches and samples of inks shall be one pint. Upon approval of the reflective sheeting system, the brand name will be placed on a list of prequalified reflective sheeting systems. One-pint ink samples are required for qualified manufacturers prior to bid approval. All additional requirements pertain to manufacturers seeking certification prior to bid process.

3.1.1 Samples of transparent colored acrylic overlay films shall be applied over white Type 3 reflective sheeting applied to a 12-inch by 12-inch aluminum panel. Each of the standard colors listed in this document shall be supplied for evaluation.

3.2 The approval will be based on the ability of the sheet manufacturer to supply custom inks or blending/mixing instructions to achieve custom process colors and the following standard colors of reflective sheeting, inks, transparent acrylic overlay films and vinyl films. The inks shall have a drying time that will result in the sign to be dry to the touch in 1 hour and allow the sign to be package with slip-sheet paper in 2 hours without the ink sticking to the paper.

Type 1: Sheeting- white, yellow, orange, green, red, blue, brown
Inks- clear, red, blue, yellow, black, orange, brown, green, thinner, violet, lemon yellow and magenta

Type 3: Sheeting- white, yellow, orange, green, red, blue, brown
Inks- clear, red, blue, yellow, black, orange, brown, green, thinner, violet, lemon yellow and magenta

Type 7: Sheeting- white, yellow, orange, green, red, blue, brown
Inks- clear, red, blue, yellow, black, orange, brown, green, thinner, violet, lemon yellow and magenta

Prismatic Fluorescent: Sheeting- fluorescent yellow green, fluorescent yellow, fluorescent orange
Inks- clear, red, blue, yellow, black, orange, brown, green, thinner, violet, lemon yellow and magenta

Acrylic Overlay Films: Green, red, brown, blue, orange, yellow, violet, clear, black

Vinyl Films: White, black, green, brown, blue, orange, yellow, red, gold, clear,

4.0 CERTIFICATION AND ACCEPTANCE.

4.1 To obtain final acceptance of the materials, the manufacturer shall furnish a certification to the sign shop supervisor at destination for each lot, certifying that the material supplied conforms to all requirements specified and stating that the material supplied is the same as the material tested for manufacturer and brand name approval.

5.0 SIGN FABRICATION.

5.1 The bidder shall meet with the MoDOT sign shop superintendent, (573) 526-3573, at the MoDOT sign shop, before submitting a bid, and review MoDOT's current sign fabrication process.

5.2 The bidder shall discuss, with the MoDOT sign shop superintendent, any fabrication

process changes needed to properly construct any sign in the MoDOT sign shop with the proposed manufacturer's material. The bidder shall provide a detailed written statement listing the needed changes, if any, including installation and labor-hours, for each change, to include as a minimum the following items.

5.2.1 Silkscreen mesh size and cleaning procedures.

5.2.2 Silkscreen ink system requirements (i.e. one or two part, premixing requirements, clear coating requirements, ventilation requirements).

5.2.3 Drying requirements for silk-screened signs, to include sign separation distance, airflow rate and drying time.

5.2.4 Special mounting or orientation requirements of the reflective sheeting.

5.2.5 Procedures and devices to be used to apply material to aluminum extruded panels, to include as a minimum a description of any roller assembly, heating equipment or cutting equipment.

5.2.6 Compatibility of the pre-punched sheeting with MoDOT's electronic cutting device.

5.3 The MoDOT sign shop currently maintains a minimum production capacity of 15,625 square feet per week. Any changes in the fabrication process shall maintain or exceed that minimum production.

6.0 WARRANTY.

6.1 The manufacturer shall warrant that the Type 1 reflective sheeting and inks supplied to fabricate signs as specified herein, shall meet the following requirements for seven years from the date of sign fabrication. The manufacturer shall warrant that the Type 3 and Type 7 reflective sheeting, transparent films and inks, supplied to fabricate signs as specified herein, shall meet the following requirements for ten years from the date of sign fabrication. If any of the following occur during the above specified warranty period, the manufacturer shall ,at MoDOT's discretion, either reimburse MoDOT for all labor and equipment costs related to remanufacturing and installing the sign or arrange for the sign to be fabricated and installed by a contractor of manufacturer's choosing.

6.1.1 The reflective sheeting or ink deteriorates due to natural causes to the extent that the sign is ineffective for its intended purpose when viewed from a moving vehicle under normal day and night conditions.

6.1.2 The reflective sheeting coefficient of retroreflection (Ra) is less than 50 percent of the specified values for the 0.2° observation angle and -4.0° entrance angle.

6.2 The full warranty shall cover the use of reflective sheeting on all types of substrates listed in Sec 2.0.

6.3 In some cases, one manufacturer's reflective sheeting,ink or transparent films may be directly applied to a different manufacturer's reflective sheeting. The full warranty shall cover all applications specified herein.

7.0 TECHNICAL SUPPORT.

7.1 The manufacturer shall provide technical support services pertaining to sign materials, sign fabrication and sign performance by providing on-site technical support within 2 business days after receiving a request from MoDOT. The on-site technical support representative shall be capable of assisting MoDOT with production operations, sign evaluations and instructional training.

8.0 PURCHASING.

8.1 The reflective sheeting and transparent films will be purchased by the square foot. The unit price per square foot for reflective sheeting shall include all inks, thinners, clear coats, protective washers, slip sheet packing material, and on-site technical support as required during the contract period. The slip sheet packing material, upon written request, shall be furnished within 15 working days as precut sheets packaged in cardboard boxes at a rate of 250 sheets per box. Slip-sheet packing material shall not contain any material that may interfere with the silkscreen process, such as silicone.

8.2 The cost of all of the process changes including equipment, hardware and installation listed in Sec 5.0 shall be included in the unit bid price.

8.2.1 The low bidder shall supply and install all needed changes listed in Sec 5.0, at no additional cost to MoDOT. All equipment and hardware supplied shall be new. The low bidder shall fully warrant all bidder supplied equipment and hardware, during the contract period, not to include normal maintenance.

8.2.2 MoDOT approval of new bidder furnished equipment and hardware will be based on acceptable performance after installation. All equipment and hardware supplied by the low bidder shall become MoDOT property after installation and approval.

8.2.3 MoDOT reserves the right to cancel this contract if there are any unaccounted for costs, during the implementation and use of the low bidder's material.

8.3 The material will be ordered on an as needed basis and shall be delivered within 30 days from the date of the purchase order. Any pre-cut reflective sheeting shall be cut to specifications provided on the order.

8.4 The manufacturer shall deliver all material F.O.B. MoDOT Highway Sign Manufacturing Shop, 754 MoDOT Drive, Dock "D", Jefferson City, MO 65109.

9.0 CANCELLATION.

9.1 MoDOT reserves the right to cancel the contract at any time if any of the requirements of this specification are not met. Should MoDOT exercise the right to cancel the contract for such reasons, cancellation will become effective upon the date specified in the written notice of cancellation sent to the supplier.