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**MAINTENANCE BUREAU SPECIFICATION 2008 – 1 GS**

**COMPLETE HIGHWAY GUIDE SIGNING & MAINTENANCE**

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**01 – General Requirements**

All parts used in constructing highway signs shall be new and shall conform to the requirements of these Specifications, the Plans and the AASHTO Specifications for Sign Supports for highway signs, luminaires and traffic signals, latest edition. If any departures of materials and fabrication from the Plans or Specifications are deemed necessary by the Contractor, details of such departures, and the reasons, therefore, shall be submitted to the Engineer for approval. No such departure shall be made without the prior written approval of the Engineer. The Contractor shall furnish the Department notarized certified copies of the chemical and physical properties of all materials incorporated in the structures and accessories that are required for this work.

**02 – Aluminum and Composite material signs**

Aluminum and composite material mounted signs shall conform to the requirements of the following Specifications, unless otherwise specified:

- (a) Extruded shapes (sign panels), bars, rods, ASTM B 221, Alloy 6063, T6.
- (b) Structural shapes, ASTM B 308, Alloy 6061-T6.
- (c) Bolts other than anchor bolts, ASTM B 211, Alloy 2024-T4. Chromated sealed anodic coating at least 5  $\mu\text{m}$  (0.0002 in.) thick shall be applied to all finished bolts.
- (d) Nuts, ASTM B 211, Alloy 6262-T9 for 5/16 in.(8 mm) and larger, and Alloy 2024-T4 for 1/4 in.(6 mm) and under, tamper-proof type.
- (e) Washers, ASTM B 209, Alloy Alclad 2024-T4.
- (f) Weld filler wire, ASTM B 285, Alloy ER5356 or ER5556.
- (g) Flange splicing material, ASTM B 209, Alloy 6061-T6.
- (h) Rivets, ASTM B 316, Alloy 6053-T6.
- (i) Shims, ASTM B 209, Alloy 1100-0.
- (j) Letters, numerals, and symbols, ASTM B 209, Alloy 3003-H14. Allow symbols to be demountable

**05 – Fabrication**

(a) General.

Fabrication of all signs shall be in accordance with the details shown on the plans and be consistent with manufacturers' recommendations. Any departure from the Plans shall be submitted in the form of shop drawings. Work shall be done in a uniform, workmanlike manner.

All signs shall be fabricated in a plant operated by a fabricator who has the necessary experience to manufacture quality signs meeting these Specifications. The Contractor shall furnish the Department the name of the fabricators of the signs before fabrication is started and, if requested by the Department, information shall be furnished as to the fabricator's qualifications and experience. (Certification by sheeting manufacturer required)

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#### (b) Multiple Panel Signs-Extruded Panels

Multiple panel signs shall be made of extruded sections. All extruded sections shall be 12 in.(30 cm)wide, mounted horizontally and shall have no vertical joints. All panels shall be flat and straight within commercial tolerances established by the aluminum industry.

#### (d) Cutting (Metals).

Materials 1/2 in.(13 mm) thick or less may be sheared, blanked, sawed or milled. Materials over 1/2 in.(13 mm) thick shall be sawed or milled. Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be filleted by drilling prior to cutting. Flame cutting will not be permitted for aluminum.

#### (e) Bolt Holes (In Metals).

Bolt Holes shall either be drilled to finished size, or they may be blanked to finished size provided the diameter of the blanked hole is at least twice the thickness of the metal being blanked.

#### (f) Preparation of Signs Surfaces.

All fabrication including cutting, welding and punching of holes, excluding mounting holes for demountable letters, numerals, symbols, and borders, shall be complete prior to surface preparation. Prior to painting or application of reflective sheeting to the aluminum, sign panels shall be treated in strict accordance with the following procedure and composite material sign panels shall be treated per the manufacturer's recommendations:

##### 1. Preliminary Cleaning.

A complete submersion in a six per cent solution of an inhibited alkaline cleaner at 160 to 180° F(71 to 82° C) for 3 minutes followed by a cold water rinse.

##### 2. Etching.

Preliminary cleaning shall be followed by a surface etch by immersion for three minutes in a 6 to 8% dilute phosphoric acid solution followed by spraying with a cold water rinse and immersion for 1 minute in circulating hot water at 180° F(82° C).

##### 3. Handling.

No metal shall be handled, except by device or clean canvas gloves, between all cleaning and etching operations and the application of paint and/or reflective sheeting. There shall be no opportunity for metal to come in contact with grease, oils, or other contaminating substances after cleaning and etching and prior to the application of paint and/or reflective sheeting.

#### (g) Shop Painting and Reflectorization.

All legends, borders and background shall be of the color and placed on the sign as shown on the Plans.

##### 1. Application.

Reflective sheeting shall be applied to properly treated base panels with mechanical equipment in a manner specified for the manufacture of traffic signs by the sheeting manufacturer.

Sign faces comprising two or more pieces or panels of reflective sheeting shall be carefully matched for color at the time of sign fabrication to provide uniform appearance and brilliance, both day and night. Nonconformance may result in non-uniform shading and an undesirable contrast between adjacent widths of applied sheeting which will not be acceptable. Splices shall be held to a minimum. When spliced, adhesive coated sheeting may be butt spliced; the gaps shall not exceed 1/32 in.(800 µm). (For a 12" extrusion sheeting width shall be 12.75". Sheetting shall extend a minimum of 0.125" beyond panel face and be tightly adhered to panel edge.

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### 2. Digital Printing

All numbers, letters and borders on signs shall be digitally printed (directly or through reverse image) before the sheeting is attached to the panels, unless otherwise approved by the Engineer. All digitally printing shall be done in a workmanlike manner and as recommended by the manufacturer of the reflective sheeting. Route Shields or symbols other than the US Route Shield (MI - 4a) and the Alabama Route Shield (MI - 5a) may be digitally printed separately and applied directly over the background sheeting.

Appropriate manufacturer's recommended overlamine films must be used in digitally printing. Any noticeable deviation from the shades shall be cause for rejection of any sign.

Digitally printed sign shall meet the following requirement for legends, borders, and accessories:

(a) Digitally Printed Signing Materials

Signing materials must be of Type IX or higher with transparent overlamine UV protection film.

(b) Printing Resolution

The printing resolution shall be a minimum of 200 dots per inch (DPI).

(c) Registration

A registration mark shall be printed to identify the start of the leading edge of each sign panel. The registration mark shall enable alignment of sign panels.

(d) Image Durability

Durability of the imaging materials shall be equal to that of the base reflective sheeting.

(e) Print Width

The print width must be 12.75 inches wide.

### 3. Symbols

All symbols (other than those mentioned in 05.(g). 2. "Digital Printing") on signs that require a separate fabrication step shall be direct applied to the finished sign according the sheeting manufacturers recommendations, unless otherwise approved by the Engineer. Finished colors shall match the prescribed Standard Interstate Colors (AASHTO Manual).

## **06 – Reflective Sheeting**

Reflective sheeting shall meet the requirements of AASHTO M 268 and the supplementary requirements for fungus resistance of AASHTO M 268. The sheeting material shall have a precoated pressure activated adhesive backing protected by a removable liner.

Reflective Sheeting for all signs with a SILVER-WHITE, YELLOW, RED, GREEN, BROWN or BLUE background shall be Micro-prismatic Lens material meeting or exceeding the minimum levels of performance as specified in the table below. The Engineer reserves the right to do quality assurance checks through the Contractor's work site after installation of the traffic signs. If traffic signs are identified that do not meet the requirements outlined in this specification or the material requirements for sheeting materials outlined in Division 800, Materials, the Contractor shall take action to correct the deficiencies and the Department may sample additional signs to their satisfaction until acceptance of the individual work order performance is verified. After this verification, the Department will then accept from the Contractor the performance and warranty bond for each particular work order. All background material shall meet or exceed the requirements for Type IX, as specified by AASHTO M 268, with the following changes:

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<b>0.2 Degrees Observation</b>	<b>Minimum R<sub>A</sub> Initial</b>	<b>Minimum R<sub>A</sub> 15 Years</b>
White	570	455
Yellow	425	340
Red	114	90
Blue	26	20
Green	57	45
<b>0.5 Degrees Observation</b>	<b>Minimum R<sub>A</sub> Initial</b>	<b>Minimum R<sub>A</sub> 15 Years</b>
White	400	280
Yellow	300	240
Red	80	64
Blue	18	14
Green	40	32

### **07 – Legends, Borders and Accessories**

Letters, numerals, symbols, borders and route markers shall conform to the MUTCD:

#### **Type A** (Direct Printed Reflective Sheeting Copy)

The silver-white letters, numerals, and borders shall be of a pre-coated pressure sensitive adhesive reflective sheeting and shall meet the requirements of Subsection 06 (Type IX or higher as specified by AASHTO M 268).

#### **Type B** (Demountable) is not permitted.

Demountable copy is defined as any numeral, letter, or border which must be attached to the sign face. All letters, numbers, and borders must be printed directly on the sheeting.

#### **Type C Cut-Out** (Direct Applied Reflective Sheeting Copy)

Symbols and/or route markers (other than those specified in 05.(g).2 “Digital Printing”) shall be of a pre-coated pressure sensitive adhesive reflective sheeting and shall meet the requirements of Subsection 06 (Type IX or higher as specified by AASHTO M 268). All cut-out symbols and route markers shall be approved for process method by the Department prior to fabrication.

### **08 – Payment, Terms, and Conditions**

- **Unless otherwise noted in this specification, referenced specifications drawing or special provisions, all work must satisfy Section 710 and 880 of the ALDOT STD Specifications and all other applicable ALDOT STD Drawings 2008.**

#### **Payment Items**

**Guide Signs Complete:** Established on a square foot unit basis. SF prices include the cost of all labor, equipment, and materials to fabricate the aluminum apply the reflective sheeting material, inks, copy, etc., label, inspect, package, and ship the signs. SF price also includes delivery to the jobsite, removal (if required), installation, inspection, clean-up and redressing of, right-of-way as needed. SF price also includes monitoring,

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certification, database and reporting of completed work, durability, and in-service performance as specified herein in Sections 09 through 15.

### **09 – Electronic Traffic Sign Inventory System**

In addition to the installation of each traffic sign, the Contractor shall maintain an electronic sign inventory system in accordance with the requirements of this specification. This sign inventory system shall be maintained through the duration of the performance bond period of the contract. Each sign shall be fabricated with a unique sign identification label with number for cross reference with the electronic sign inventory system.

### **10 – Submittal of Material and Installation Requirements.**

The Contractor shall submit four copies of complete material and installation data for the traffic signs material to the Engineer for review prior to the installation of the materials. The submittal shall include the following:

- Identification of the components of the materials (sign posts, sign faces, and substrate);
- Special equipment required for installation;
- Identification of the supplier of the traffic signs material;
- Identification of the supplier of the traffic sign unique ID label and testing information verifying service life readability through the warranty period of the sign face sheeting material.

The Engineer will return material and installation submittals that are incomplete. The installation of the traffic signs shall not begin until the Maintenance Engineer notifies the Contractor in writing that the submittal is accepted and complete.

### **11 – Traffic Sign Identification Code.**

Each new traffic sign installed under this contract shall be fabricated with a unique bar code identifier label attached to the sign. The bar code shall be manufactured for a readable service life of 12 years using commercially available scanning devices. The bar code label shall not exceed 2 ½ inches wide by ¾ inches high. The Contractor shall submit to the Engineer a drawing for each type of sign showing location of the bar code identifier. These drawings and bar code locations on the sign face or back of the sign face shall be approved by the Engineer prior to delivery of the sign faces to the projects site.

### **12 – Submittal of Certification of Traffic Sign Installation Location.**

Upon receipt and acceptance of an individual work order, the Contractor shall notify the Engineer of their schedule and plan to complete the work. Upon receipt of such plan, the Department will then stake field locations of all traffic signs within \_\_\_\_ calendar days. After staking all sign locations, the Contractor is then responsible to conduct utility locates and verify any sign location adjustments as required.

The installation of the traffic signs shall be certified as meeting the requirements for retroreflectivity, color, and the tolerances for placement (offset from edge of road, horizontal placement along stationing). The certification of installation shall be submitted by the Contractor and shall include the documentation of the actual field locations made by the Contractor using GPS coordinates after installation. The final installation and GPS coordinates shall be posted to the electronic sign inventory system for viewing by the Department.

The Engineer will perform spot checks of the placement of traffic signs. The Contractor shall address all insufficiencies found by the Engineer. Recertification of the installation of the traffic signs shall be done by the Contractor after the correction of insufficiencies.

### **13 – Annual Submittal of Certification of Performance.**

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A "Certification of Performance" shall be submitted annually for a total period of seven years (eight submittals, first submittal after installation, remaining seven submittals at the end of each calendar year). The annual submittal of the Certification of Performance shall be done by the Contractor. A commitment to submit an annual Certification of Performance for seven years shall be a part of a written bond furnished by the Contractor.

The traffic signs shall be certified as having sign faces meeting the requirements for reflectivity and durability. The certification process shall conform to FHWA Methods for Maintaining Traffic Sign Retroreflectivity in publication No. FHWA-HRT-08-026, and shall be submitted annually after the date that all traffic signs are accepted by the Department for the beginning of a bonding period. The certification shall be submitted within 30 calendar days of the anniversary date of the beginning of the bonding period.

The "Certification of Performance" shall be submitted annually to the Engineer in electronic format, through the use of an Internet-based sign inventory and data management method in accordance with the requirements of this specification. The Contractor shall furnish all performance data and the certification on an annual basis through this electronic method.

The Contractor is not required to warrant signs that are knocked down by passing motorists or any other means or for signs that are damaged or destroyed due to circumstances beyond the Contractor's control including vandalism.

The annual certification shall be submitted to the Division Engineer with a copy to the Maintenance Engineer.

#### **14 – Electronic Traffic Sign Inventory System.**

(a) DESCRIPTION.

- i. This work shall consist of providing an Internet-based Traffic Sign Inventory site to the Department that will allow tracking traffic signs installed under the terms of this contract.
- ii. The Internet site shall include all specific requirements outlined in this specification and shall be accessible by Department designated individuals only, by use of an interactive password security system.
- iii. Upon completion of each individual work order under the terms of this contract, the contractor shall deliver to the Department the complete database of sign inventory information, through computerized download off the Internet-based system.

(b) SITE COMPONENTS.

**The Internet-based Sign Inventory site shall consist of the following components.**

- a. The Internet site shall be constructed on a base map provided by the Department, of the Department jurisdiction using an Arc-info or similar type style base map of sufficient accuracy for the project. The base map shall indicate all applicable roadways within Department right-of-way and shall designate such roadways by proper name.
- b. The Internet site shall include navigation capabilities to pan and zoom different views at various locations and resolutions on the base map, allowing for viewing the project area and reported information.
- c. The Internet site shall be a secure site, accessible from a typical personal computer, and shall be accessible by password only. Passwords shall be granted to individuals at the Departments discretion.
- d. The Internet site shall exhibit click and drag capability to allow the user to select a project feature or features (i.e. roadway corridor for pavement marking project) to obtain information about that roadway segment. When the cursor is placed over a project feature, data shall be

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displayed about that feature per the DATA REQUIREMENTS portion of this specification.

(c) DATA REQUIREMENTS.

**Data reported on the Internet based web site for each sign component shall consist of the following:**

- a. Sign identification number (barcode)
- b. Work Order Identification
- c. Sign style and type (MUTCD)
- d. Dimensions
- e. Date of Installation
- f. Sign Sheeting Type and Manufacturer
- g. Location (GPS coordinates)
- h. Digital Photograph
- i. Post type

**15 – Site locations for each sign component shall be shown on the base map and plotted using GPS coordinates. Sign components shall be identified by symbol according to type of sign and shall be color-coded according to sign style. A legend shall be provided identifying the color code for each sign style category by MUTCD type.**

The Internet site shall provide a selection process allowing the Engineer to select a group of components and display a table showing the information and attribute data in tabular form.

The data included shall be downloadable from the Internet based system by the Engineer, prior to final payment under this contract, in an Excel file or text file in tabular format, organized in columns. The tabular data shall include the GPS coordinates utilized to map the sign components on the Internet site base map.

The Internet based web site shall be fully functional within 10 working days of the notice to proceed on the contract or within ten (10) working days after receipt of the Department provided base map, whichever is later.

Data on the web site shall be updated on a regular basis to report progress of work on the contract. Sign replacement, installation, and repair activity shall be posted to the web site within 48 hours after work occurs.