

1. GENERAL REQUIREMENTS

There will be a mandatory pre-bid meeting.

The Contractor must submit a bid on all items or the bid will be deemed incomplete and thus rejected.

The work shall include installation of Highway signs, and/or Highway sign structures on an individual work order basis as determined by the Alabama Department of Transportation (ALDOT). Each individual work order shall be issued to the Contractor and shall be completed in the time specified for that work order.

All parts used in constructing highway signs shall be new and shall conform to the requirements of these Specifications, ALDOT Standard and Special Highway Drawings, ALDOT Standard Specifications for Highway Construction, latest edition, the Plans, and the AASHTO Specifications for Sign Supports for highway signs, luminaires and traffic signals, latest edition adopted by ALDOT. 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 steel incorporated in the structures.

All sign/structure material installed by the Contractor shall appear on the ALDOT "List of Qualified Materials, Sources, and Devices", if applicable.

Contractors shall provide a performance bond equal to \$1 million dollars during the term of the contract. In addition, the contractor will be required to provide a warranty bond for each purchase order placed by the Department. The value of the warranty bond shall be equal to the purchase order invoice. The term of the warranty bond will be consistent with Bonding Period as listed in section 05 Reflective Sheeting for Bonded Period. The warranty bond would survive the term of the contract.

2. DEFINITIONS

Supplemental Panel – Sign panel that is attached to a Specific Service (LOGO) Motherboard on an Interstate Mainline and/or Ramp sign.

Sign Hanger – Support used to attach a Guide Sign to an Overhead Sign Bridge Structure.

Ladder – Structure installed to allow access to the Bridge of an Overhead Sign Structure. (New Construction Only)

Walkway – Structure installed on the Bridge of an Overhead Structure to allow safe access to components on the Overhead Sign Bridge. (New Construction Only)

Structure Modification – Includes the removal of ladder, catwalk, or luminaries on an Overhead Sign Bridge Structure.

3. MOBILIZATION

The Mobilization line item will be used on purchase orders less than \$20,000.00 and/or if permanent barrier wall is installed.

4. GUIDESIGN, CLASS 6, INSTALLED

The Contractor is only responsible for the installation of sign(s) that will be provided to them by the Alabama Department of Transportation (ALDOT). The contractor shall not be responsible for any warranty obligations for signs provided to them by the ALDOT.

Line Item 7, "SIGN, CLASS 6, REPAIR, ERECTING OF SIGN (POST NOT INCLUDED)" shall include new fuse and hinge plates. This work shall cover the repair of signs that have failed at the fuse and hinge point. (Example: Blow overs)

5. TEMPORARY TRAFFIC CONTROL

All shoulder closures shall be a subsidiary of the work performed.

The contractor shall provide the ALDOT temporary traffic control plan(s) (when applicable) for approval before proceeding with installation of guide signs and/or structures for guide signs.

Temporary traffic control plans shall be accordance with the Manual for Uniform Traffic Control Devices (MUTCD), latest ALDOT adopted edition.

For this contract, Traffic Control Devices shall be paid per set up/take down per location per day.

6. LINEAR DELINEATION SYSTEM

A. Material

Linear Delineation System panels are fabricated from Diamond Grade Reflective Sheeting and are laminated onto a thin gauge of aluminum and formed to a unique shape, which provides retroreflection across a very wide range of entrance and observation angles. All panels have a standard length of 34 inches (36 inches is the actual length of the Panel before formation).

B. Linear Delineation Panel Sizes and Colors

Linear Delineation Panels can be 1.5 inches or 6 inches and can be white, fluorescent yellow, or fluorescent orange.

C. Installation

Linear Delineation Panels shall be spaced at 18 inches for day or night contrast, especially into and around a curve such as a cloverleaf entrance. If Linear Delineation System Panels are spaced on a barrier or guardrail, running parallel with traffic, space should be at a maximum of 36 inches between panels.

D. Installation Methods

1. VHB Acrylic Foam Tape 5962

VHB Acrylic Foam Tape 5962 (or Equivalent) is a double-coated pressure sensitive adhesive tape for bonding a wide range of substrates. 3M Spray 90 Adhesive (or Equivalent) must be used to unify the surface and improve the tape bond. To install the VHB Acrylic Foam Tape 5962 (or Equivalent) remove the backing from the tape and press the linear delineation system panels firmly into place.

2. Anchor Bolt Method

$\frac{1}{4}$ " X 1" stainless steel anchor bolts and 5/16" nylon washer can be used to mount the Linear Delineation System Panels to a concrete barrier.

3. Application with Brackets

The bracket can be used with the 6 inch Linear Delineation System Panels. Installation shall consist of 3 brackets per panel. For mounting the bracket to the panel the use of 3M Wido-Weld Super Fast Urethane will be used (or Equivalent).

E. Measurement

Linear Delineation System shall be measured in total linear feet, not linear feet of panels.

7. SIGN MATERIALS

All Sign Materials shall conform to the requirements listed in Section 880 of the ALDOT Standard Specification for Highway Construction, latest edition.

8. OVERHEAD, CANTILEVER, AND BUTTERFLY STRUCTURE(S)

All Overhead, Cantilever, and Butterfly structures shall be designed in accordance with the requirements given in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, latest edition adopted for use by ALDOT, and requirements in the Alabama Department of Transportation Standard Specifications and Construction Manual, latest edition, Section 718, STRUCTURES FOR TRAFFIC CONTROL DEVICES AND HIGHWAY LIGHTING and Section 891, STRUCTURES FOR TRAFFIC CONTROL DEVICES AND HIGHWAY LIGHTING.

All Overhead, Cantilever, and Butterfly structures shall be designed in accordance with the "Maximum Design Sign Area" as shown for each line item within the contract for Overhead, Cantilever, and Butterfly structures. The exception to this would be if the structure is being built for a Dynamic Message Sign (DMS), in that instance the structure will be built to the

specifications of the DMS not the “Maximum Design Sign Area” as shown for each line item within the contract.

9. FABRICATION

A. General

Fabrication of all signs and supports 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 fabrication of steel components specified to be galvanized, including the forming of holes or perforations shall be completed prior to galvanization.

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)

B. Extruded Panel

Multiple panel signs shall be made of extruded sections. All extruded sections shall be 12 in. (30cm) wide, mounted horizontally and shall have no vertical joints. All panels shall be flat and straight within commercial tolerances established by the aluminum industry. Exceptions will be made to allow 6 in. (15cm) wide extruded sections in cases where the height of a sign or exit panel dictates. There shall not be more than one 6 in. (15cm) wide panel allowed per individual sign or exit panel.

In the event the length of the extruded aluminum panel exceeds the maximum length that can be galvanized (Due to the width of the Guide Sign), it shall be acceptable to have more than one extruded aluminum segment to complete the sign fabrication and installation. If it is necessary to fabricate and install a Guide Sign in this manner it shall be the contractor’s responsibility to determine where to split the sign vertically, to determine the length of each extruded aluminum segment.

C. Cutting (Metals).

Materials ½ in. (13mm) thick or less may be sheared, blanked, sawed, milled or plasma cut (industry standard). Materials over ½ in. (13mm) thick shall be sawed, milled, or plasma/oxy-fuel cut) industry standard). 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.

D. Bolt Holes (In Metals).

Bolt Holes shall either be drilled, blanked, punched, or plasma/oxy fuel cut to finished size provided the diameter of the blanked hole is at least twice the thickness of the metal being blanked.

E. 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 percent solution of an inhibited alkaline cleaner at 160 to 180 F (71 to 82 C) for 3 minutes 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.

F. 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. (800µm). For sheeting applied to extruded sections, the sheeting shall extend a minimum of 0.125" beyond the panel face and be tightly adhered to the panel edge. For a 12" extruded section the sheeting width shall be 12.75". For a 6" extruded panel section the sheeting width shall be 6.75".

2. Digital Print

All numbers, letters, and borders on Guide 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 digital printing shall be done in a workmanlike manner and as recommended by the manufacturer of the reflective sheeting. (Exception allowed for symbols and legends that are different than background color).

Appropriate manufacturer's recommended overlamine films must be used in digital 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 Type XI 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 shall be 12.75 inches wide for a 12 inch extruded section. The print width shall be 6.75 inches wide for a 6 inch extruded section.

3. Symbols

All symbols on signs that require a separate fabrication step shall be direct applied to the finished sign according to the sheeting manufacturers' recommendations, unless otherwise approved by the Engineer. Finished colors shall match the prescribed Standard Interstate Colors (AASHTO Manual). Shall be applied in Section 04, Article F., Subsection 2.

10. REFLECTIVE SHEETING FOR GUIDE SIGN(S)

1. Class 4 Signs
Shall be made in accordance with Section 710 and 880 of the ALDOT STD Specifications' and all other applicable ALDOT STD Drawings (current edition)
2. Class 6 and 10 Signs
Reflective sheeting shall meet the requirements of ASTM D4956 including the Supplement S1 on fungus resistance. The contractor must select reflective sheeting from List V-1, Section for Type XI Sheeting, as stated in the Alabama Department of

ALABAMA DEPARTMENT OF TRANSPORTATION
 TA-677 GUIDE SIGN FABRICATION/INSTALLATION SPECIFICATION

Transportation’s Materials, Sources, and Devices with Special Acceptance Requirements (MSDSAR). The sheeting material shall have a pre-coated pressure activated adhesive backing protected by a removable liner.

Reflective Sheeting for all guide 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 guide signs. If guide signs are identified that do not meet the requirements outlined in the 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 XI, as specified by AASHTO M 268, with the following changes:

0.2 Degrees Observation -4 Entrance Angle	Minimum R _A Initial	Minimum R _A 15 Years
White	570	455
Yellow	425	340
Red	114	90
Blue	26	20
Green	57	45
0.5 Degrees Observation -4 Entrance Angle	Minimum R _A Initial	Minimum R _A 15 Years
White	400	280
Yellow	300	240
Red	80	64
Blue	18	14
Green	40	32

11. LEGEND, BORDER, AND ACCESSORIES

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

Type A (Digitally 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 05 (Type XI or higher as specified by AASHTO M 268-08).

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 shall be of a pre-coated pressure sensitive adhesive reflective sheeting and shall meet the requirements of Subsection 06 (Type XI or higher as specified by AASHTO M 268-08). All cut-out symbols and route markers shall be approved by a Department prior to fabrication.

12. SUBMITTAL OF MATERIALS 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:

1. Identification of the components of the materials (sign posts, sign faces, and substrate);
2. Special equipment required for installation;
3. Identification of the supplier of the traffic signs material
 - I. Base reflective sheeting
 - a) If the sheeting manufacturing location is ISO 9001 certified at the time of submission:
 - i. A certificate of performance for each lot of each color used in a work order
 - b) For any sheeting manufacturer
 - i. Actual reflectivity measurement for each roll of each color; minimum three (3) each with an industry accepted instrument and at least two geometries for reflectivity.
 - ii. Alternatively, unprinted sheeting to be certified through testing of finished signs at the same time as certifying printed color.
 - II. Printed colors on reflective sheeting
 - a) If printing is performed by a manufacturing location that is ISO 9001 certified at the time of submission:
 - i. A certificate of performance for each printed color of each ink type for each production run
 - b) For any sign printing facility
 - i. Actual measurements of a random sampling of 3% of signs in each production run (but never less than 3 signs) of each printed color for each different type of ink. (Black printing is exempt from reflectivity
4. 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.

In addition to the Certification of Performance for retroreflectivity, the Contractor shall also certify that all guide signs meet appropriate color retention requirements. For each of Years 4, 8, 10, and 12 years of service, the Contractor shall conduct a visual assessment of color on guide signs grouped into sample sets. A sample set shall consist of guide signs installed in a single work order and further subdivided by sign face direction along a corridor (north, south, east, or west facing

direction). Guide sign sample sets shall be evaluated for color conformance and performance shall be reported accordingly.

If any guide signs are observed to deviate considerably in color from others in the sample set, and the legibility of the characters and words on the guide sign is compromised due to the color deviation, during either daytime or night conditions, the Contractor shall take the additional step of conducting field measurements of color on the guide sign faces in question. Measurements shall be conducted as follows:

- I. Field measurements of both legend and background for color shall include:
 - a) 1% of (but not less than 2 signs) all guide signs within each sample set, each facing direction evaluated separately of each sign color combinations (white on red, black on yellow, black on white, white on green, white on brown, white on blue). Signs considered to be non-conforming shall be sampled first.
 - b) Two measurement locations on each sign
 - c) Measurement shall be taken with an approved colorimeter to determine Cap Y on the sign face
 - d) The same sample set of signs must be used for each periodic certification
 - e) Cap Y values shall be compared with initial standards for color

If a determination is made that legibility is compromised on the guide sign due to a color deficiency, the sign shall be replaced.

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

13. TRAFFIC SIGN IDENTIFICATION INFORMATION

SIGN INFORMATION REQUIREMENTS.

The following traffic sign and guide sign attributes shall be submitted to the Engineer upon completion of the sign/structure installation in a format that is compatible with the ALDOT sign inventory system.

- a) Sign identification number (barcode)
- b) Work Order Identification
- c) Sign style and type (MUTCD)
- d) Sign Description Field
- e) Dimensions
- f) Date of Installation (post and sign)
- g) Sign Sheeting Type and Manufacturer
- h) Sign Substrate
- i) Location (GPS Coordinates)
- j) Digital Photograph
- k) Post Type and Size

- l) Date field for future inspection
- m) Name of Inspector
- n) Assessment Ratings
- o) Comments

14. 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 14 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 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.

15. 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 (current edition).

Payment Items

Highway Sign 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, certification, and reporting of completed work, durability.