



Robert Bentley
GOVERNOR

ALABAMA
DEPARTMENT OF TRANSPORTATION
MAINTENANCE BUREAU
1409 COLISEUM BOULEVARD
MONTGOMERY, ALABAMA 36130-3050

PHONE (334) 242-6272

FAX (334) 242-6378



John R. Cooper
TRANSPORTATION DIRECTOR

Maintenance Bureau Specification 2001-02
for
Advance Warning Arrow System, Trailer-Mount
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This document describes the features and specifications for a trailer-mounted, “Advanced Warning Arrow System”. The arrow board shall meet or exceed the following: 1) Currently adopted edition of the MUTCD, chapter 6, section entitled “Arrow Panels”, 2) Section 741 of the current edition of the ALDOT Standard Specifications for Highway Construction, and 3) and the specification found herein. All products must be inspected by the State Signal Shop for acceptance on to the Approved Products List (APL) for the State. Proper paper work and fees shall be on file prior to any inspection taking place. All products submitted for bid shall be pre-qualified and included in the Alabama Department of Transportation’s “Materials, Sources, & Devices with Special Acceptance Requirements” (APL), List IV-3, “Work Zone Traffic Control Devices”, sub-heading “*Arrow Boards*”.

1.0 General

The following items will be addressed in the following sections: cabinet, display, control system, power source, and mounting assembly.

- 1.01 Bonded delivery and warranty of the product shall be made available.
- 1.02 All wire, cable and other electrical components shall be properly sized/rated for the unit and its operation and shall be suitable for exposed, outdoor installations subject to adverse weather conditions. The wiring harness shall be securely fastened inside the arrow panel to reduce fatigue at the lamp terminals.
- 1.03 The system shall be protected against short circuit, overload, and reverse polarity by appropriate fuses and protective devices.
- 1.04 The Advance Warning Arrow System shall be supplied with all software and hardware required for the operation and maintenance of this system, this is to include all manuals and guides.
- 1.05 The circuitry and controls shall be covered by a one year warranty from the date of invoice to the final user. All components shall be covered by their respective manufacturers.
- 1.06 Manufacturers exact model # including current configuration shall be readily visible.

2.0 Cabinet

- 2.01 The perimeter frame of the arrow panel shall be constructed of extruded aluminum channel, approximately $\frac{1}{8}$ inch thick minimum.
- 2.02 The arrow panel shall be sealed to withstand all types of weather conditions.
- 2.03 Internal bracing shall be used to provide adequate resistance to twisting, bending, and vibration.
- 2.04 A weep hole shall be provided in the bottom of the panel frame to provide drainage of condensation as needed.

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- 2.05 The exposed panels and framing shall be finished in non-reflective/flat black.
- 2.06 The minimum height from the roadway to the bottom of the arrow panel shall be 7 feet.

3.0 Display

- 3.01 The advance warning arrow panel shall utilize a 25 lamp, PAR 36 or 46 (LED), yellow/amber element, configuration.
- 3.02 The arrow panel shall operate in the following modes
 - 1. Flashing Arrow, Left & Right
 - 2. Sequential Arrow, Left & Right
 - 3. Sequential Chevron, Left & Right
 - 4. Flashing Double Arrow
 - 5. Flashing Caution
- 3.03 The arrow panel display shall be 48" x 96". Larger sizes may be considered, but not recommended.
- 3.04 The minimum element on-time shall be 50% for flashing modes, and equal intervals of 25% for each sequential phase.
- 3.05 The flashing and sequential rates shall be not less than 25 nor more than 40 time per minute.
- 3.06 There shall also be a device installed to control the lamp intensity appropriate to ambient light conditions, up to 50% dimmer from full brightness, and not be affected by vehicle headlights or street lights.
- 3.07 The back of the arrow panel shall contain indicator lamps denoting what mode is in operation on the front of the panel. These indicator lamps shall be legible in daylight hours from a minimum of 300 feet.

4.0 Control System

- 4.01 The control system for the display shall house the solid state circuitry, ON/OFF switch, mode switch, manual dimming controls, and related circuitry.
- 4.02 The control system shall be housed in a weather resistant, lockable box.
- 4.03 The control system circuitry shall be capable of providing, at a minimum, lamp intensity regulation over the range of 10.0 to 15.0 volts DC.

5.0 Power Plant

- 5.01 The power for the arrow system shall consist of a solar-assisted, battery bank.
- 5.02 The battery bank shall be housed in a lockable container with expanded steel sides or some other equally effective ventilation design or material to permit continuous operation in ambient temperatures up to 120° F.
- 5.03 An onboard battery charger to be supplied with a 110 VAC connection routed to the outside of the enclosure.
- 5.04 The system shall be capable of operating for a minimum of 25 days with the solar cell(s) disconnected from the battery bank (i.e. run off of the battery bank for a minimum of 25 days).
- 5.05 Unit shall have high visible RED 2" circular LED, located on rear of display in upper top left corner, illuminating indicating when batteries have reached 50% of maximum power.

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6.0 Trailer Assembly

- 6.01 The trailer shall be all steel constructed with $\frac{1}{8}$ inch thick deck plates, arc welded to a steel tube frame.
- 6.02 The trailer shall be engineered to provide adequate strength and support for the arrow panel.
- 6.03 The arrow panel shall be raised and lowered by means of a ratchet-type, hand crank winch using $\frac{1}{4}$ inch braided steel cable or by a suitable spring, counter-balanced hand-lift.
- 6.04 Locking mechanisms shall be provided to allow the locking of the panel in both the raised and lowered positions.
- 6.05 The trailer fenders shall be heavy gauge, formed steel, full width, with interior splash shields. (Nonmetallic fenders may be considered, based on the design and a minimum required load rate of 250 lbs. with minimum deformation. Must endure 10 year lifespan without deterioration, and supply independent lab results confirming).
- 6.06 The trailer shall be equipped with a conventional swivel jack with folding, handle mounted to the draw-bar assembly immediately behind the towing hitch.
- 6.07 The trailer hitch shall be capable of connecting to either a Class II 2" ball or pintel-hook tow bar, along with two $\frac{5}{16}$ inch minimum safety chains welded or otherwise securely fastened to the tongue of the trailer.
- 6.08 The trailer axle shall be rated no less than 2000 pounds.
- 6.09 The trailer shall also be equipped with four (4) adjustable stands, one at each corner for support, constructed of 1- $\frac{3}{4}$ inches x 1- $\frac{3}{4}$ inches Unistrut (or similar post-type jack stand design of equal strength) complete with foot-pads, mounting pads, locking pins, and clips.
- 6.10 All trailer parts, excluding the wheels, shall be finished with a minimum of (5 mil) combined primer and Federal Orange paint.
- 6.11 All nuts and bolts shall be steel, minimum grade 5, stainless steel.
- 6.12 A gun/peep sight shall be installed on the framework to assist in the aligning of the arrow panel.
- 6.13 The overall length of the trailer including the hitch and arrow panel shall not exceed 15 feet. The overall width of the trailer without the arrow panel shall not exceed 7 feet 0 inches. The overall height shall not exceed 8 feet with the arrow panel in the "Down" position.
- 6.14 A standard four wire, quick disconnect coupling shall be supplied with each unit for connection to the towing vehicle's lighting system.