

102 TRAFFIC CONTROL - MOT DEVICES.

(REV 5-21-01) (FA 10-25-01) (7-02)

SUBARTICLE 102-3.2 (Pages 107 and 108) is expanded as follows:

102-3.2.7 Portable Arrow Boards:

102-3.2.7.1 Scope: These Specifications expand the basic requirements that all portable arrow boards must meet the physical display and operational requirements as described in the MUTCD.

Manufacturers seeking approval of their arrow board shall provide the Department with a prototype unit to be evaluated in accordance with these Specifications and certify that the furnished unit meets all requirements specified herein.

102-3.2.7.2 Display Panel and Housing:

(a) The display housing assembly shall be weather-tight to protect the panel from the elements.

(b) All nuts, bolts, washers and other fasteners shall be of corrosion resistant material.

(c) The display assembly shall be equipped with an automatic dimming operational mode capable of a minimum of 50% dimming and a separate manual dimmer switch.

(d) The display panel background and frame for the display assembly shall be painted flat black and must meet Federal Specification TT-E-489.

(e) Display panel and housing shall be designed and constructed to allow the unit to be operated in the displayed position at speeds of 30 mph [50 k/h]. In the down position it shall be designed for speeds of 65 mph [105 k/h].

(f) The display panel, when raised in the upright position, will have a minimum height of 7 feet [2.1 m] from the bottom of the panel to the ground, in accordance with the MUTCD.

(g) The unit shall have an accessible mechanism to easily raise and lower the display assembly. A locking device shall also be provided to ensure the display panel will remain in the raised or lowered position.

102-3.2.7.3 Arrow Board Matrix:

(a) The minimum legibility distance for various traffic conditions are based on the decision-sight distance concept. The minimum legibility distance is the distance at which the arrow panel message can be comprehended by a driver on a sunny day or a clear night. The arrow panel size that is needed to meet the legibility distance is listed as follows:

Type	Minimum Size	Number of Panel Lamps	Minimum Legibility Distance
B	30 by 60 inches [750 by 1,500 mm]	13	3/4 mile [1.0 km]

Type	Minimum Size	Number of Panel Lamps	Minimum Legibility Distance
C	48 by 96 inches [1,200 by 2,500 mm]	15	1 mile [1.5 km]

For use on the state highway system, the Types “B” or “C” advance warning arrow boards may be used for low to intermediate (0 to 50 mph) [(0 to 80 km/h)] facilities and for maintenance or moving operations on high-speed roadways. Type “C” arrow boards shall be used on high-speed (50 mph and up) [(80 km/h and up)].

(b) Devices shall meet all arrow board displays identified in the MUTCD.

(c) The lamp lens should be 5 3/4 inches [145 mm] in diameter. Smaller lamp lens diameters are permissible only if they provide an equivalent or greater brightness indication and meet the legibility criteria in Section (a) of this Specification.

(d) The color of the light emitted shall be in accordance with the MUTCD.

(e) There shall be a 360 degree hood for close-up glare reduction.

(f) For solar powered arrow boards the bulbs shall provide a 350 candle power intensity for day use and an automatic reduction or dimming capacity for night use. The dimmed night operation shall provide adequate indication without excessive glare.

(g) The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute as required in the MUTCD.

(h) The minimum lamp “on time” shall be 50% for the flashing arrow and 25% for the sequential chevron.

102-3.2.7.4 Electrical System: For diesel engines the following shall apply:

(a) The power supply and electrical system shall be self contained within the unit.

(b) The engine shall have an electrical starting system.

(c) The power source furnished shall be of sufficient size so as to provide the required maximum load energy plus 25%.

(d) The electrical system shall meet the National Electrical Code where applicable.

(e) A backup power system that shall operate the unit for a minimum of three hours automatically when the motor driven generator fails to operate.

(f) The starting batteries and back-up power supply system batteries shall be automatically charged when the generator is operating.

(g) The engine shall be supplied with an ammeter and the generator shall be supplied with a volt meter showing voltage to the sign assembly.

For solar powered units the following shall apply:

(a) The unit shall provide automatic recharging of power supply batteries to normal operating levels.

(b) Solar array recovery time shall be accomplished in a maximum of three hours.

102-3.2.7.5 Battery Life Test: The following shall apply to batteries:

(a) The photovoltaic unit shall be able to operate from a full battery charge without sunlight for a period of not less than 21 days.

(b) The battery shall be equipped with a controller to prevent overcharging and over-discharging. An external battery level indicator shall also be provided.

(c) The battery, controller, and power panel shall be designed to be protected from the elements and vandalism.

102-3.2.7.6 Controller:

(a) Controller and control panel shall be housed in a weather, dust, and vandal resistant lockable cabinet.

(b) The controller shall be solid-state in design and function.

102-3.2.7.7 Support Chassis: The following shall apply:

(a) The support chassis shall be self-contained and self-supporting without the use of additional equipment or tools.

(b) Both trailer and truck mounted units are allowed.

(1) Trailer mounted unit:

(a) The sign, power supply unit and all support systems shall be mounted on a steel, wheeled trailer with a minimum capacity of 2,600 pounds [1,180 kilograms].

(b) The trailer shall be equipped with class-A lights, using a plug adaptor.

(c) The trailer shall be equipped with adjustable outrigger leveling pads (screw-type), one on each of the four frame corners.

(d) The trailer shall be designed to be set up at the site with its own chassis and outriggers, without being hitched to a vehicle.

(e) The trailer shall be equipped with fenders over the tires and shall be made from heavy duty metal sufficient to allow a person to stand and operate or perform maintenance on the unit.

(f) The trailer shall meet all equipment specifications set forth in Chapter 316 of the Florida Statutes, and by such rule, regulation or code that may be adopted by the Department of Highway Safety and Motor Vehicles.

(2) Truck mounted unit:

(a) The truck mounted assembly shall be designed to fit on a 1/2 ton or greater duty truck.

(b) The unit shall be self contained with its own power supply, controls, raising and lowering device and shall be capable of being operated by one person.

(c) The unit shall be secured in the vehicle for normal operation.

102-3.2.7.8 Other Requirements:

(a) The portable arrow board assembly shall be designed to function in dry, wet, hot or cold weather (ambient temperature ranges from -30 to 165°F [-35 to 78°C]). Other environmental requirements shall be as specified in Section 615.

(b) The controller shall not be affected by mobile radio, or any other radio transmissions.

(c) An operators manual shall be furnished with each unit.

(d) The manufacturer's name and FDOT approval number shall be affixed on the equipment.

(e) The arrow board shall be listed on the Qualified Products List (QPL).

102-3.2.8 Variable Message Signs:

102-3.2.8.1 Scope. Variable Message Signs (VMS) must meet the physical display and operational requirements as described in the MUTCD as Portable Changeable Message Signs (PCMS's), Index 600 of the Design Standards and the requirements of this Specification.

The 7 foot by 10 foot [2.1 by 3 m] VMS as defined in 102-3.2.8.3 may be used as advanced warning maintenance of traffic devices and to supplement other traffic control devices used in work zones.

The 5 foot by 8 foot [1.5 by 2.4 m] VMS as defined in 102-3.2.8.3 may be used as alternates to either type A or type B arrow board on advanced warning vehicles or to supplement other traffic control devices used in a work zone.

A 5 foot by 8 foot [1.5 by 2.4 m] VMS may be used as a stand alone maintenance of traffic device only when used for accident or incident management situations as defined in the MUTCD.

Manufacturers seeking approval for their VMS shall provide the Department with a prototype unit to be evaluated in accordance with these Specifications and certify that the unit meets all requirements specified herein.

Permanent installations can be used but will be evaluated for each specific project or installation. These standards shall include but not be limited to the following:

102-3.2.8.2 Display Panel and Housing:

(a) The display housing assembly shall be weather-tight to protect the panel from the elements.

(b) All nuts, bolts, washers and other fasteners shall be of a corrosive resistant material.

(c) The message matrix panel background and frame for the changeable message assembly shall be painted flat black (must meet Federal Specification TT-E-489).

(d) Servicing of all message matrix panel components shall be accomplished from the front of the message matrix panel.

(e) Each message matrix panel shall provide a glare screen for each message line to aid against sun glare for non-reflecting type signs.

(f) The display panel, when raised in the upright position, will have a minimum height of 7 feet [2.1 m] from the bottom of the panel to the ground.

(g) The unit shall have an accessible mechanism to easily raise and lower the display assembly. A locking device shall also be provided to ensure the display panel will remain in the raised or lowered position.

102-3.2.8.3 Message Matrix:

(a) The overall dimensions of the 7 foot by 10 foot [2.1 by 3 m] VMS message matrix panel shall be a maximum height of 7 feet [2.1 m] by a maximum width of 10 feet [3.0 m]. The overall dimensions of the 5 feet by 8 feet [1.5 by 2.4 m] VMS message matrix panel shall have a maximum height of 5 feet by a maximum width of 8 feet [1.5 by 2.4 m].

(b) The message matrix panel shall contain three separate lines. Each line shall consist of eight characters, equally spaced a minimum of the equivalent to a single column of inactive matrix elements. Each character shall contain 35 pixels in a five by seven horizontal to vertical grid arrangement.

(c) Each message line of the 7 foot by 10 foot [2.1 by 3 m] VMS shall provide for characters 13 inches [330 mm] in width by 18 inches [457 mm] in height and variable graphic and symbol sizes to a minimum of 18 inches [457 mm] in height. The 5 foot by 8 foot [1.5 by 2.4 m] VMS shall provide for characters 9 inches [229 mm] in width by 12 inches [305 mm] in height and variable graphic and symbol sizes to a minimum of 12 inches [305 mm] in height.

(d) Ensure LED's are amber (590 nm dominate wavelength) and meet the visibility and legibility requirements of this Specification and have a viewing angle no less than 23 degrees. Ensure the intensity does not fall below 80 percent within three years. For flip disk matrix signs, the disk elements shall be coated on the display side with a highly reflective florescent yellow Mylar material, and on the back with a flat black meeting Federal Specification TT-E-489 to blend in with the flat black background.

(e) Similar components shall be interchangeable.

102-3.2.8.4 Electrical System: For diesel engines the following shall apply:

(a) The power supply and electrical system shall be self contained within the unit.

(b) The power source furnished shall be of sufficient size so as to provide the required maximum load energy plus 25%.

(c) The electrical system shall meet the National Electrical Code where applicable.

(d) A lightning protection device shall be provided for stationary equipment.

(e) The engine shall have an electrical starting system.

(f) A backup power system shall be provided that will operate the unit for a minimum of three hours automatically when the motor driven generator fails to operate.

(g) An automatic charging system to recharge the starting and backup power supply batteries, when the generator is operating.

(h) The engine shall be supplied with an ammeter and the generator shall be supplied with a volt meter showing voltage to the sign assembly.

For solar powered units the following shall apply:

(a) The photovoltaic unit of the 7 foot by 10 foot [2.1 by 3 m] VMS shall be designed to provide 21 days of continuous operation without sunlight with a minimum of on site maintenance. The photovoltaic unit of the 5 foot by 8 foot [1.5 by 2.4 m] VMS shall be designed to provide 12 days of continuous operation without sunlight with a minimum of on site maintenance.

(b) Automatic recharging of power supply batteries shall be provided.

102-3.2.8.5 Battery Life Test:

(a) The battery shall be equipped with a battery controller to prevent overcharging and over-discharging. An external battery level indicator shall be provided.

(b) The battery, controller, and power panel shall be designed to withstand the elements and vandalism.

102-3.2.8.6 Controller:

(a) Controller and control panel shall be housed in a weather, dust, and vandal proof lockable cabinet.

(b) The keyboard shall be equipped with a security lockout feature to prevent unauthorized use of the controller.

(c) The controller shall be solid state in design and function.

(d) The control panel shall display a representative message that will be displayed on the sign panel.

(e) The flash rate shall be adjustable in the sign controller from one to ten seconds.

102-3.2.8.7 Operation and Performance:

(a) The message shall be displayed in upper case except when lower case is project specific and is allowed by the MUTCD.

(b) The message matrix panel shall be visible from 1/2 mile [0.8 km] and legible from a distance of 650 feet [200 m] under both day and night conditions. Under variable light level conditions the sign shall automatically adjust its light source so as to meet the 650 feet [200 m] visibility requirement.

(c) The control panel shall have the capability to store a minimum 50 pre-programmed messages.

(d) The controller in the control panel shall be able to remember messages during non-powered conditions.

(e) The controller shall allow the operator to generate additional messages on site via the keyboard.

(f) For a VMS using Flip-Disk technology, the controller shall have the capability to provide a stipulated default message upon loss of controller function.

(g) All messages shall be flashed or sequenced. In the sequence mode, the controller shall have the capability to sequence three line messages during one cycle.