

September, 2013

12" Character Height Full Matrix Blinker Radar™ LED Radar Driver Feedback Sign

1.0 General

- 1.1 All equipment shall be new, unused, not refurbished, and of the highest quality in durability and workmanship.
- 1.2 Each solar-powered speed feedback sign shall be fully self-contained and capable of providing passing motorists real-time feedback regarding their vehicle's speed via radar speed detection.
- 1.3 Vehicle speed shall be detected using a radar module mounted within the electronics enclosure.
- 1.4 The radar speed detection range shall be 5 MPH to 140 MPH.
- 1.5 The sign enclosure shall be made of heavy 1/16 inch continuous formed aluminum powder-coated DOT highway green.
- 1.6 The sign's design shall consist of a NEMA 3R rated enclosed electronic control system.
- 1.7 The enclosed electronic control system shall be removable from the sign chassis without removing the mounting component from the pole.
- 1.8 The display window shall be made of 3/8 inch shatter-resistant clear polycarbonate.
- 1.9 The static sign face shall consist of Federally specified .080 gauge, 5052 aluminum and conform to MUTCD standards. The sign sheeting shall be reflective 3M™ DG3 diamond grade cubed or equivalent prismatic sheeting, with an anti-graffiti overlay.
- 1.10 The housing shall be provided with tamper proof fasteners.
- 1.11 The alphanumeric characters of the sign shall be yellow (amber).

2.0 Display

- 2.1 The sign shall include a speed display consisting of a single full-matrix solid state alphanumeric display comprised of 693 discrete LEDs individually aimed to provide even light distribution within the viewing area.
- 2.2 Numeric characters (speed display) shall be 9 inches high.
- 2.3 The sign shall be capable of displaying digits 0 to 99.
- 2.3 The sign shall be capable of displaying the message 'SLOW DOWN' consisting of two lines of 5" high characters.

- 2.4 The sign shall be capable of displaying a 12 inch high 'smile' or 'frown' face.
- 2.5 The display light intensity shall be controlled by a photocell to provide optimum view ability under all ambient light conditions.
- 2.6 The display shall be designed to avoid distracting the attention of motorists away from the road, by prevention of viewing from acute angles outside the motorist's normal field of view. The viewable area shall enclose an area up to a maximum included angle of 30 degrees from the roadside.
- 2.7 The display shall be capable of multiple operation modes.
- 2.8 The display shall have a three (2) year parts warranty.

3.0 Power

- 3.1 Each sign shall be solar powered and capable of fully autonomous operation 24 hours per day, 365 days per year.
- 3.2 Solar panel shall be 85 Watt, 12 VDC.
- 3.3 The charging system shall use two (2) batteries. The batteries shall be Absorbent Glass Mat lead acid 12 Volt 35AH.
- 3.4 The charging control system shall be a solar industry standard item with temperature compensating charging voltage.
- 3.5 The battery cabinet shall be insulated, powder coated DOT highway green, and vandal and tamper resistant (including assembly hardware).
- 3.6 The battery cabinet shall house the batteries and charge controller.

4.0 Controller Functions

- 4.1 The controller shall include an onboard real-time clock with built in daylight savings.
- 4.3 The controller shall allow the radar to operate independently from the display so that the sign can collect data while the display is blank or off.
- 4.4 The controller shall provide programmable display speed thresholds, display modes and operation schedules.
- 4.4 The controller shall be capable of speed data collection of minimum and maximum speeds.
- 4.4 The controller shall be capable of strobing (flashing) display output.

5.0 Sign Programming Software

- 5.1 Sign programming software shall be compatible with Windows XP, Windows Vista, Windows 7.

- 5.2 Sign software shall provide data collection, data analysis, and sign programming capability.
- 5.3 Sign communication shall be achieved using Bluetooth wireless technology.
- 5.4 The sign communication port shall allow uploading and downloading of traffic data, sign logs, firmware updates, and configurations.

6.0 Mounting Hardware

- 6.1 Each sign shall include the mounting hardware required to mount the sign, battery cabinet, and solar panel to existing posts, poles or portable base.

7.0 Warranty

- 7.1 The minimum warranty for equipment, materials, and technical support shall be for a period of two (2) years from the date of delivery of the equipment. The warranty shall cover manufacturer's defects and parts.

8.0 Technical Support

- 8.1 Sign delivery shall include one (1) manufacturer's operation, installation, and user manual.
- 8.2 Sign delivery shall include one (1) license-free copy of manufacturer's sign programming software.
- 8.3 Sign delivery shall include one (1) sign programming software operation, installation, and user manual.

BlinkerSign[®] Light-Emitting Diode (LED) Sign: Solar-powered Version, enhanced with Day-Viz[®] LEDs

1.0 Description

The Manufacturer shall provide a solar-powered BlinkerSign[®] LED-enhanced sign assembly. This sign's high-intensity Day-Viz[®] LEDs are visible in all weather and ambient light conditions to increase the conspicuity of the sign. AutoBright[™] control circuitry monitors ambient light levels throughout the day and night, and automatically regulates the brightness of the LED array to provide optimum visibility.

The BlinkerSign[®] LED-enhanced sign is fully compliant with the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). The LED array's color and shape help to convey the sign type to roadway users, both day and night.

Sign shall have a minimum of 3 years of field history experience. References maybe requested.

Materials: The Day-Viz[®] Blinkersign[®] assembly shall include the following items:

1. Sign

- a. All signs shall conform to 2009 Federal Highway Administration's MUTCD section 2A.07 on retroreflectivity and illumination. MUTCD standards.
- b. The sign face shall be a (indicate the MUTCD # and/or sign legend) sign with (indicate the number of LEDs) (indicate the color) LEDs.
- c. All signs blanks shall be .080" gauge aluminum minimum.
- d. Sheeting used shall be 3M[™] DG3 diamond grade or similar prismatic sheeting, unless required with a lower grade of reflectivity and include anti-graffiti overlay protection.
- e. All sign assemblies shall use anti-vandal fasteners to mount components to sign and sign to fixture.

2. LEDs

- a. Each sign assembly shall consist of up to 8 high power 1 watt Luxeon[®] LEDs that provide a maximum light intensity of up to 550,000mcd (millicandelas) with a viewing angle of 15°.
- b. Each LED shall be sealed in 7/8" diameter, heat dissipating plastic enclosure to provide resistance to weather and vibration.
- c. All LED enclosures shall be mounted in a 1" hole and ultrasonically welded to the sign assembly to provide maximum strength and rigidity.

- d. All LEDs shall be wired in strings to activate simultaneously per MUTCD standards and wired in a manner (parallel) that all LEDs continue to flash in the event of failure of an individual LED.
- e. All wire used shall conform to military specifications, MIL-W-16878D, Type D, vinyl nylon jacket.
- f. Wiring shall be encapsulated inside a 1" x 3/8" aluminum extrusion secured to the sign assembly, to provide weather resistance and protection.
- g. All LED connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.
- h. Visible from 2 miles line of sight at night and just under 1 mile during daylight hours

3. Solar Panel

- a. All solar panels shall be up to 13.5" x 15" in size and provide up to 13.5 watts peak total output sized for all climate and geographical locations.
- b. All panels shall be mounted to an aluminum plate and bracket at an angle of 45°- 60° to provide maximum output. Bracket shall be secured to a 2-3/8" aluminum tube. (NOTE: COLLECTOR MUST FACE SOUTH)
- c. All fasteners used shall be anti-vandal.
- d. Wire used shall conform to military specifications, MIL-W-16878D, Type D, vinyl nylon jacket.
- e. The solar panel assembly shall be mounted directly to the back of the sign assembly and be a fully self contained onto a 2-3/8" OD round aluminum housing.
- f. All solar panel connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.

4. Control Circuit

- a. The control circuit shall have the capability of independently flashing dual outputs. The flashing output current and duty cycle shall be programmable.
- b. The flashing output shall be 50 to 60 flashes per minute with 100msec duration on time. The outputs shall reach the output current as programmed for the duration of the 100msec pulse.

- c. The output current shall be individually programmable for day and night time operation. The day and night time mode will automatically be determined by solar panel charge input and adjust to match ambient lighting conditions.
- d. The controller shall provide 6 levels of brightness control determined by ambient conditions.
- e. The controller will manage the battery charge and LED brightness levels in order to accommodate 30 days of continuous use without any charge.
- f. The control circuit shall be potted in a cylindrical epoxy resin housing to be waterproof and housed in a 2-3/8" aluminum tube.
- g. The control circuit shall operate between the temperatures of -40° to +176°F (-40° to +80°C).
- h. All circuit connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.

5. Battery

- a. Battery packs shall be 4.8 volt 14000mAH Nickel Metal Hydride (NiMH). Battery dimensions shall be 10.5" x 1.5" x 1.5".
- b. All batteries shall be sealed in a plastic film to provide resistance to moisture and corrosion, and shall be housed in a 2-3/8" aluminum tube.
- c. All batteries shall operate between the temperatures of -40° to +176°F (-40° to +80°C).
- d. All batteries shall have fusing between each cell and shall be protected from overheating by means of a thermocouple sensor.
- e. All battery connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.

Warranty:

Manufacturer shall offer a two year unconditional warranty against all defects in material and workmanship.

LED ENHANCED STOP SIGN SYSTEM, SOLAR POWERED, WITH RADAR VEHICLE SPEED ACTIVATION

1.0 Description

This work shall consist of furnishing to the department a radar activated daylight visible LED warning sign system that is solar powered with a radar activation device. . The quantity of signs to be furnished shall be detailed in the plans.

2.0 General Requirements

- 2.1 Each sign system shall consist of a daylight visible LED warning sign and shall conform to the 2004 Federal Highway MUTCD section 2A.08 on retro reflectivity and illumination.
- 2.2 Each sign system shall be a complete assembly, consisting of but not limited to, the pole, breakaway Device, sign mounting, radar device, solar panel, radio and electrical components (wiring, battery, solid-state circuit boards, etc).

3.0 Functional Requirements

- 3.1 Each LED sign system shall require solar power.
- 3.2 Each LED sign system shall be activated by radar device.
- 3.3 The LED sign system shall be normally dark, shall initiate operation only upon radar activation over a set speed threshold, and shall cease operation after a predetermined time limit.
- 3.4 When activated, the sign system LED's shall flash in unison per MUTCD requirements.
- 3.7 Each LED sign system shall have radar based vehicle speed detection to detect vehicle speed and flash the LED warning sign to alert oncoming vehicles.
- 3.8 All hardware shall be certified to meet NEMA TS2 Environmental Standards.

4.0 Materials

Furnish a daylight visible LED warning sign system to be a complete assembly, consisting of but not limited to, the pole, breakaway device , signage, sign mounting, radar activation device, solar panel, battery, solar controller, wireless radio and electrical components (wiring, solid-state circuit boards, etc). The Stop sign system assembly includes the following items:

4.1 LED Warning Sign

- a. The LED warning sign shall be a LED enhanced, fully self-contained unit and shall conform to the 2004 Federal Highway MUTCD section 2A.08 on retro reflectivity and illumination.

- b. This sign shall have 8 high power AMBER light emitting diodes (LED) that provide maximum daytime brightness, with automatic dimming for reduced night brightness.
- c. The LEDs shall be mounted in each of the corners along the border to enhance the shape and increase conspicuity, which is a federal standard.
- d. The sign shall have 3M DG3 prismatic sheeting with Anti-Graffiti overlay for maximum reflectivity and protection.
- e. All signs shall conform to MUTCD standards.
- f. All sign blanks shall be .080 or .100 gauge aluminum.
- g. Sheeting used shall be 3M DG3 or similar prismatic sheeting, unless required with a lower grade of reflectivity.
- h. All sign assemblies shall use anti-vandal fasteners to mount components to sign and sign to fixture.

4.2. LEDs

- a. Each sign assembly shall consist of up to 8 high power AMBER LEDs that provide a maximum light intensity of up to 600,000mcd (millicandelas) with a daytime visibility of over 1 mile with a viewing angle of 20°.
- b. All LEDs shall match the color of the sign sheeting, as per section 2A.08 of the MUTCD.
- c. Each LED shall be sealed in 7/8" diameter, heat dissipating plastic enclosure to provide resistance to weather and vibration. Center LED shall be less than 1/4".
- d. All LED enclosures shall be mounted in a 1" hole and ultrasonically welded to the sign assembly to provide maximum strength and rigidity.
- e. All LEDs shall be wired in a parallel string to prevent total light failure in the event a single LED would fail.
- f. All LEDs shall activate simultaneously as per MUTCD standards.
- g. All wire used shall conform to military specifications, MIL-W-16878D, Type D, vinyl nylon jacket.
- h. Wiring shall be covered and secured to the sign assembly using a 1"x3/8" aluminum extrusion to provide weather resistance and protection.
- i. All LED connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.

4.3. Control Circuit

- a. The control circuit shall have the capability of independently flashing up to two separate LED signs. The flashing light level

- shall be user programmable with the use of a Windows GUI (Graphical User Interface) Software programming device.
- b. The flashing output shall be 50 to 60 flashes per minute programmed for the duration of the flash time.
 - c. The output current shall be individually programmable for day and night time operation. The day time and night time flashing current ranges shall be from 0mA to 2000mA with 1mA increments. The day and night time mode will automatically be determined by outside lighting conditions with 9 levels of brightness control.
 - d. The control circuit shall be in a plastic housing and waterproof.
 - e. The control circuit shall operate between the temperatures of -40c and + 80c.
 - f. All circuit connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.

4.4 Battery

- a. Battery unit shall be a 4.8 volt 14000mAH Nickel Metal Hydride (NiMH).
- b. All batteries shall be sealed in a plastic film to provide moisture and corrosion resistance.
- c. All batteries shall operate between the temperatures of -20°C and +60°C.
- d. All battery connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 3 feet deep for 30 minutes. Connectors shall be Deutsch DTM series.
- e. All batteries shall be internally fused as to provide over current protection.
- f. All batteries shall be equipped with an internal thermal sensor as to prevent over temperature being applied to the battery.
- g. All batteries used shall be TAPCO #2795-6.

4.5 Speed Radar Detector

- a. The speed radar detector shall be a one-piece programmable stationary directional true Doppler Radar.
- b. The detector shall be programmed to monitor only the speed of vehicles coming towards the system.
- c. The operating band shall be the K-Band operating at a Frequency 24.125 GHz \pm 5Mhz with a Power Output 5mW.
- d. The detector shall operate between 9 VDC to 18VDC with Reverse battery protection.
- e. The detection range shall typically be 300 feet (90 meters) on level road mounted 5 feet off the ground.

- f. Nominal Operating Current/Power 9mAmps @12VDC / 0.1Watts
- g. The Operating Temperature shall be -40F to +185F (-40C to +85C) and housed in a weatherproof housing.
- h. The speed radar detector shall be capable of being programmed by an IR Remote Programmer.(Remote optional)
- i. Data Interfaces: Serial Communication RS232 and RS485
- j. The detector shall have an accuracy of +/-0.1 Mph (0.16 Kmph) and a speed range of 10 Mph to 105 Mph (8Kph to 168 Kph)
- k. The detector shall have US Approvals FCC Part 15 for license free operation. FCC ID "TIASS300"

4.8 Solar Panel

- a. The solar panel shall be up to 13.5"x15" in size and provide up to 26 watts peak total output.
- b. The Solar panel shall be mounted to an aluminum plate and bracket at an angle of 45°- 60° to provide maximum output.
- c. All fasteners used shall be anti-vandal.
- d. All solar panel connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series.
- e. Solar panels shall be TAPCO # 2772-2.

5.0 Construction

