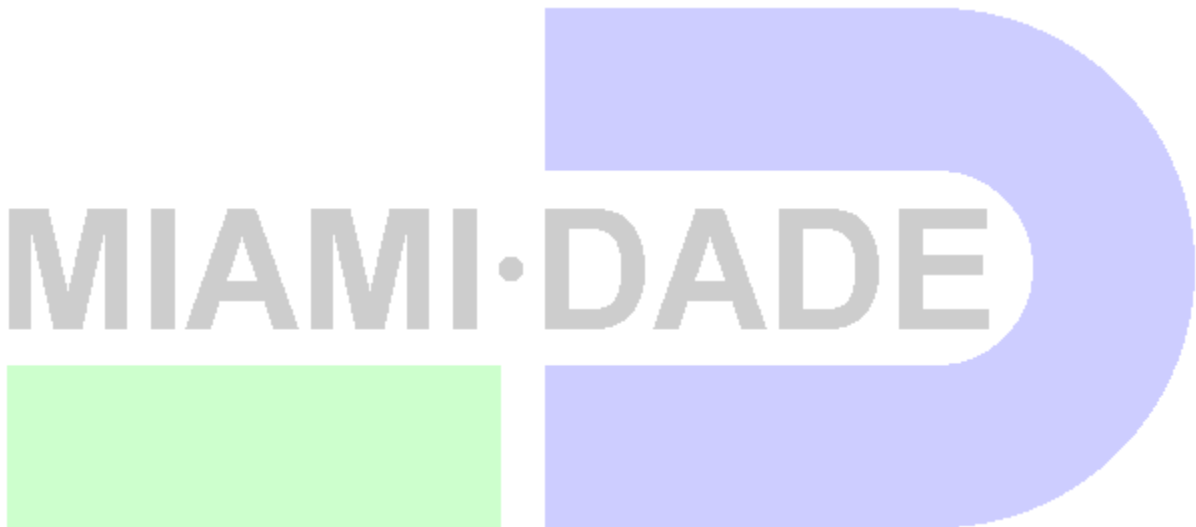


**Miami-Dade County Public Works Department
Traffic Signals & Signs Division**

SECTION 700 - Electronic Display Signs

**Technical Specifications
for
ELECTRONIC SPEED FEEDBACK SIGN
(ESFS)**



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Miami-Dade County specification for Electronic Speed Feedback Signs (ESFS) meet or exceed the Florida Department of Transportation's (FDOT current Minimum Specifications for Traffic Control Signals and Devices (MSTCSD), used for the evaluation and certification/approval for listing on the FDOT Approved Product List (APL), and establishes the minimum standards required on MDPW Qualified Product List (QPL) for use in Miami-Dade County, FL.

A700-1 Description

Electronic Display Signs (EDS) as listed under Section 700 by the Florida Department of Transportation (FDOT) are specialized electronic signs that include dynamic display components. The term EDS refers to a general category of electronically enhanced signs. All EDS shall meet the physical display and operational requirements for warning or regulatory signs described in the FHWA Manual on Uniform Traffic Control Devices (MUTCD) and its companion document, the Standard Highway Signs Book (SHS).

This specification shall cover only one (1) type of electronic signs under this general category of signs, the Electronic Speed Feedback Sign (ESFS). The ESFS is designed to alert motorists of their speed as they approach the sign to alert all road users to conditions that call for a reduction of speed in the interest of safety and to improve efficiency of traffic operations in a particular area along the roadway.

A700-2 General Requirements

ESFS shall allow attachment to vertical and horizontal support structures as part of a single sign post configuration. All electronic assemblies shall meet the requirements of FCC, Title 47 Subpart B Section 15.

The sign shall be designed to withstand the loads defined in the FDOT Structures Manual without deformation or damage. All ESFS assemblies shall be 150 mph wind load rated when installed to Miami-Dade specifications. Signs shall provide an option to include flashing beacons. Printed circuit boards shall be conformally coated. Housings that contain electronics shall be constructed of aluminum alloy sheet a minimum of 0.125 inches thick. Welding used during the construction of Electronic Display Signs (EDS) shall conform to the ANSI/AWS Structural Welding Code - Aluminum.

ESFS type EDS shall include a Static Sign Panel with an integrated dynamic display. Devices included on the FDOT Approved Products List (APL) and MDPW Qualified Products List (QPL) will be designated with a size and type category. On the MDPW QPL the signs are listed separately with restrictions (i.e. ESFS: "School Speed Zones", shall be programmed to operate during school hours only; ESFS: "Non-School Warning Signs", shall operate continuously 24/7 at hazardous locations only).

A700-2.1 Electronic Display Signs with Static Sign Panel

The electronic signs shall have a modular system design comprised of a static sign with an attached electronic display.

A700-2.1 Electronic Display Signs with Static Sign Panel (Continued)**A700-2.1.1 Static Sign Panel**

Static sign panels shall meet the appropriate FDOT requirements for Highway Signing found in Section 700 of the Standard Specifications for Road and Bridge Construction (SSRBC).

A700-2.1.1.1 Static Sign Legend

The sign legend "YOUR SPEED" shall be printed in black on two (2) lines with approximately 6-inch letter height. The minimum letter size of the legend shall meet or exceed the letter size prescribed in the MUTCD and SHS companion document. Font shall mimic the characteristics of fonts defined in the MUTCD and SHS.

A700-2.1.1.2 Static Sign Background Material and Colors

Static sign panels shall be provided with full cubed micro-prismatic retroreflective sheeting, ASTM Type XI with the following colors:

- A) School Zones: Fluorescent Yellow/Green
- B) Non-School Warning Signs: Yellow

A700-2.1.1.3 Static Sign Dimensions

The sign shall adhere to the MUTCD sign dimension requirements for the regulatory speed limit sign. In order to cover multi-lane highway applications, the minimum size requirement is 30" x 36" as specified in MUTCD Section 2B, Table 2B-1

A700-2.2 Electronic Display

Electronic displays shall appear completely blank (dark) when not energized. No phantom characters shall be allowed under any ambient light conditions.

A700-2.2.1 Housing

The electronic display panel cover shall be a non-glare 1/4 - inch (6.35mm) minimum thickness shatter-resistant polycarbonate face to protect and seal the dynamic display and other internal electronics. The display window shall be constructed to absorb impacts from thrown objects by allowing the display boards to deflect inward without damaging internal components.

The polycarbonate face shall be a minimum 90% ultraviolet (UV) opaque and resistant to fading and yellowing. Electronic displays incorporated within static signs shall be mounted to the back of the static sign face. The polycarbonate face shall not be recessed more than 1/4- inch from the front of the static sign.

A700-2.2 Electronic Display (Continued)

The housing shall be NEMA 3R rated and designed to prevent unauthorized access. The housing shall include weathertight cable entry or connection points for any required power or data connections. The housing shall use 1/4- inch stainless steel hex key button head screws to deter tampering while still allowing maintenance personnel a more compatible tool for removal.

A natural aluminum finish or a white 2-part epoxy paint coating may be used to minimize solar heat absorption to keep internal temperatures to a minimum for maximum component life.

Housing shall have a permanent weatherproof metallic label externally mounted. The label shall indicate whether the device is Set-up for AC, DC or both. The manufacturer's name, date of manufacture, model number, serial number, voltage requirement, and FCC approval number shall also be included.

A700-2.2.2 External Cabinet

All separate equipment cabinets provided with the ESFS shall be listed on the FDOT APL and MDPW QPL. The cabinet shall be equipped with a standard PPB-1 key lock. No other locks shall be accepted.

A700-2.2.3 Optical, Electrical, and Mechanical Specifications for Display Modules

All LEDs shall operate within the LED manufacturer's recommendations for typical forward voltage, peak pulsed forward current, and other ratings. Component ratings shall not be exceeded under any operating condition.

A700-2.2.4 LEDs and Pixels

All LEDs used in the display shall have a wavelength output that varies no more than ± 2 nanometers from the specified peak wavelength. The display and LED pixel cone of vision shall have a minimum of 30 degrees (centered around the optical axis, or zero point, of the pixel). The cone perimeter is defined by the point where light output intensity is 50 percent of the intensity measured at the zero point of the pixel. For all colors other than white, ensure that the sign display produces an overall luminous intensity of at least 9200 candelas per square meter when operating at 100 percent intensity. Manufacturer shall provide documentation that indicates the LED brightness and color bins that are used in each pixel. LEDs shall be individually mounted on a PCB, and are able to be removed and replaced using conventional electronic repair methods. Encapsulated LEDs within a pixel are not allowed.

A700-2.2 Electronic Display (Continued)**A700-2.2.4.1 ESFS Background/Foreground Colors**

The ESFS display background shall be flat black (Federal Standard 595A-37038) with a reflectance value not exceeding 25 percent. ESFS shall utilize amber LEDs with a peak wavelength of 590 nanometers. ESFS shall have a minimum 1-inch contrasting margin around illuminated characters.

A700-2.2.4.2 Legend Sizes and Fonts

The minimum numeral and letter size of the electronic display shall meet or exceed the numeral and letter sizes prescribed in the MUTCD and SHS companion document. Fonts shall mimic the characteristics of fonts defined in the MUTCD and SHS. A two-digit speed display which flashes the approaching vehicle's speed shall be comprised of amber color LEDs forming numerals approximately 15-inches in height. The "SLOW DOWN" message shall be amber color LEDs forming the letters that shall be approximately 6-inches in height.

A700-2.3 Electronic Display Controller

The electronic display controller required for the operation of the ESFS shall be housed within the sign and be equipped with a security lockout feature to prevent unauthorized use. There shall be an option that allows downloading of data but restricts users to read-only access for all other areas. Read-only access shall not allow any changes that will affect the operation of the sign. The electronic display shall not be adversely affected by radio transmissions. The controller shall provide a "blank" default message upon loss of controller function.

A700-2.3.1 Programmed Settings Backup Power Supply

Display control electronics shall maintain programmed settings and schedules indefinitely and shall incorporate a separate real-time clock backup power supply to maintain on-board clock settings through a power outage for up to two (2) weeks and recharge itself when power is restored. The backup power supply shall utilize no batteries.

A700-2.3.2 Communication

The sign shall have capabilities of wireless communication at the install site and be upgradeable to communicate from a remote location. The Electronic Display Controller shall possess a minimum of one (1) serial interface with the ability to connect to a laptop computer. The serial data interface shall support multiple data rates from 9600bps to 115200 bps.

A700-2.3.3 Configuration and Management

The sign shall be provided with computer software, by the manufacturer that allows a user to program, operate, exercise, diagnose, and read current status of all sign features and functions using a laptop.

A700-2.3 Electronic Display Controller (Continued)**A700-2.3.3.1 Sign Set-up**

The following functions shall be programmable wirelessly in the field or remotely:

- A) Date and time of day;
- B) Real-time clock correction factor;
- C) User-selectable alphanumeric sign identification code of at least 22 characters to allow unique identification of each sign location;
- D) Firmware Upgrades;
- E) Sign Schedule;
- F) Data Management - Traffic data download and memory reset

A700-2.3.3.2 Sign Scheduling

The sign schedule manages how the sign operates based on time-of-day and day of the week. The schedule shall be capable of supporting annual school calendars.

Schedule components include operating modes, daily timetables, weekly schedules, and exceptions. Software shall allow schedules and schedule components to be:

- A) Created while disconnected from the display sign and stored in the PC to upload to the ESFS wirelessly in the field or remotely;
- B) Copied and modified to easily create new schedules or schedule components;
- C) Identified with a minimum 22 alphanumeric characters;
- D) Easily transferrable to field PCs without requiring new software installation.

A700-2.3.3.3 Operating Modes

Should be able to support up to 500 operating modes to support "On", "Off", stealth functions, and varying speed limits. A mode consists of the following settings:

- A) Display "On" or "Off";
- B) Data Collection "On" or "Off";
- C) Speed Detector Settings (Speed Limit, Violation Alert, Slow Down alert, Minimum display speed, and maximum display speed/high-speed cutoff);
- D) External Device "A" and External Device "B" speed thresholds and flashing patterns (flashing in unison, alternating with each other, or flashing in synchronization with the violation alert display).

A700-2.3 Electronic Display Controller (Continued)**A700-2.3.3.4 Daily Operation**

Should be able to support 500 daily timetables that determine operating mode by time-of-day and supports up to 16 mode changes per day.

A700-2.3.3.5 Weekly Operation

Should be able to support 500 weekly schedules to be defined that determine the timetable in use by day of the week.

A700-2.3.3.6 Schedule Exceptions

Should be able to support 364 exceptions per year for up to two (2) years to be pre-programmed by date and time to support special events, construction zones, and in the case of school zones, non-school days.

A700-2.4 Operation and Performance

ESFS shall be visible from a distance of at least 1/4 mile and legible from a distance of 400 feet for applications on roads with a speed limit less than 45 miles per hour and visible from a distance of at least 1/2 mile and legible from a distance of at least 650 feet for roads with speed limits 45 miles per hour or higher. In both cases, the requirements shall be met under both day and night conditions.

A700-2.4.1 Display Intensities

The electronic display shall automatically adjust brightness for day and night operation in order to meet or exceed visibility requirements. The signs shall be equipped with a light sensor that accurately measures ambient light level conditions at the sign location. The signs shall automatically adjust LED intensity based on the ambient light conditions in small enough increments that the sign's brightness changes smoothly, with no perceivable brightness change between adjacent levels. Stray headlights shining on the photoelectric sensor at night shall not cause LED brightness changes.

A700-2.4.2 Flash Rates

Message dwell time shall be approximately one (1) second after the target passes the sign. The message flash rate shall be individually programmable between 90 and 120 flashes per minute. Flasher outputs for external flashers shall be fixed between 50-60 flashes per minute.

A700-2.5 Mechanical

Sign mounting provisions and mounting hardware shall accommodate sign weight and wind loading requirements of the FDOT Structures Manual.

A700-2.5 Mechanical (Continued)**A700-2.5.1 Sign Weight**

The housing with all components shall not exceed forty-five (45) pounds.

A700-2.5.2 Fasteners and Attachment Hardware

Use only nuts, bolts, washers, and other fasteners meeting Section 603 of the FDOT SSRBC.

A700-2.6 Electrical

All power inputs shall be fuse and reverse polarity protected. Signs shall be able to recover from power loss and return to their operational state without user intervention. The signs shall be designed to operate as either Solar Power (SP) or 120 VAC.

A700-2.6.1 Solar Power

Solar powered signs shall be capable of fully autonomous operation 24 hours per day, 365 days per year. The system shall provide for automatic battery charging, overcharge protection, and have indications that display current status and faults. Solar systems shall be designed to take into account the following factors: Minimum solar radiation available in the geographic region; total power draw for all devices connected to the sign as ordered; local site conditions.

A700-2.6.1.1 Solar Controller and Panel System

The solar controller and panel system shall include: temperature compensation, constant voltage, allowing up to 100 percent capacity, reverse leakage current protection, ambient temperatures from - 40° F to at least 122° F (- 40°C to at least + 50°C), anodized casing or equivalent, and charging indicator. Solar power signs shall have a maximum power draw of 17 watts. Solar controller shall meet all requirements of Underwriters Laboratories UL 1741.

The solar power system should be designed and supplied by the ESFS manufacturer. In the event that the solar power system is not directly provided by the ESFS manufacturer, the Vendor shall be required to obtain Manufacturer approval of the solar system to ensure proper illumination and sign operation as specified. Failure to do so, by the Vendor, shall require the Vendor to upgrade, modify, or exchange the system component(s) at their expense.

A) Solar Controller

The solar controller shall be connected to the solar panels and batteries inside a MDPW QPL approved weatherproof NEMA 3R cabinet enclosure with a natural aluminum finish reflecting sunlight for increased battery life.

A700-2.6 Electrical (Continued)

B) Solar Batteries

- 1) Battery shall be 55AH 12V DC deep cycle solar rated, sealed valve regulated, gelled electrolyte or AGM lead acid battery, and rated as non-spill able suitable for the application and operating environment.
- 2) Flooded lead acid batteries are prohibited.
- 3) Batteries shall be capable of providing ten (10) days of continuous operation without sunlight.
- 4) Battery life shall have a minimum of five (5) years.

C) Solar Array Panel(s)

- 1) Single solar panel with maximum wattage (Pmax) of 50W or higher, industry-standard 12V DC design with tempered glass.
- 2) Frames shall be anodized aluminum and rain tight, with industry-standard cable fittings.
- 3) The power output shall be designed for twenty-five (25) years of usable output and shall be free from defects in materials and workmanship for five (5) years.

D) Solar Array Panel Mounts

- 1) Mounts may be fixed-angle and shall be manufactured from corrosion proof aluminum.
- 2) Fastening hardware shall be Grade 316 Stainless Steel.
- 3) Mounts, if adjustable, shall include similar materials for adjustable leg parts for the solar array pitch angle adjustment.

A700-2.6.2 AC Power

AC powered signs shall be capable of operation from 89 - 135 volts with a frequency of 60 Hz +/- 3. Fluctuations in line voltage, within normal limits shall have no visible effect on the appearance of the luminous intensity of the display. AC power signs shall have a maximum power draw of 20 watts.

A700-2.7 Speed Detector**A700-2.7.1 Programmable Speed Thresholds and Violation Alerts**

The signs shall be programmable for the posted speed limit, violation alert flashing, Slow Down alert, and the minimum and maximum speed to display. The sign will display the driver's speed when the minimum speed threshold is reached. The signs shall detect when the posted speed is exceeded by one mile per hour (1 mph) and then activate the violation alert.

A700-2.7 Speed Detector (Continued)

When the alert is activated, the display shall flash the driver's speed. When the detected speed exceeds the maximum programmed speed (high speed cut-off) threshold, the display shall blank out or display the alert message "SLOW DOWN" until the driver's speed is lower than the message threshold. When no advancing traffic is detected, the display shall be blank. The speed detector shall not activate alerts or display speeds for vehicles outside the display's cone of vision.

A700-2.7.2 Speed Detector FCC and Power Requirements

The speed detector shall not be affected by normal radio transmissions. The signs shall meet the requirements of FCC Part 90. Radar device shall meet specifications for an FCC Part 15 Low Power Device - 24.150 GHz (K-band) and shall not require an operating license. The speed detector *shall operate on 10.8 to 16.6V DC.*

A700-2.7.2 Approach Only Radar

Signs shall monitor and display the speed of approaching traffic only. The detector shall be able to accurately detect and determine the speed of approaching vehicles. The signs shall be able to detect a motorized vehicle 1000 feet in advance of the sign. The radar shall be capable of measuring speeds between 10 and 99 mph with an accuracy of +/- 1 mph.

A700-2.8 Traffic Data Collection and Reporting**A700-2.8.1 Data Capturing and Storage**

Sign shall record and store separate data points for each target (vehicle), which shall include final speed as the target passes the sign and the date and time for each detected target. To prevent individual data points from being lost, the individual data points shall remain available in the sign until the maximum capacity is met or the end-user downloads the data into the PC. The ESFS shall have the capability of capturing vehicle speed data with the display off (stealth mode) to support "before and after" studies.

There shall be an option for circulating data collection which overwrites the oldest data records. ESFS shall have capacity to store data at least thirty-one (31) calendar days with a minimum data capture of 4500 targets (vehicles) per day before overwriting for the maximum traffic volume.

A700-2.8.2 Data Analysis and Reporting

Data collection, reporting, and graphing shall run locally on a desktop PC or a notebook PC without requiring the internet.

A700-2.8 Traffic Data Collection and Reporting (Continued)

Data shall be formatted as a comma separated value (.csv) file in ASCII file format providing access to the raw data and the ability to import into other traffic analysis tools.

Data windowing available with the ability to automatically generate reports with the subset of data; shall have the ability to select a range of dates and times that is less than the total time period for which data is collected.

Reporting software shall be easy to use and charts easy to modify. Automatic reports shall be provided in tabular and graphical analysis of the following data using a personal computer running Microsoft Excel™, and shall report the following information:

- I. Average vehicle speeds;
- II. 85th percentile vehicle speeds;
- III. Three additional percentile vehicle speeds defined by the user
- IV. Percent of conforming vehicles;
- V. Total number of vehicles;
- VI. Moving averages of vehicle speeds with the ability for the user to adjust the number of data points used in calculating the moving average.

A700-2.9 Serviceability***A700-2.9.1 Wireless Diagnostics***

For field support, programmability, data downloads and diagnostics shall be accessible via Bluetooth™ wireless link to a Windows-compatible notebook computer, and shall have the following display diagnostics with the ability to:

- I. Run a test sequence that initiates a display digit roll-up test to verify the ESFS is operating properly;
- II. Ability to measure DC voltage to the system on Solar Powered units;
- III. Validate that data is being collected and radar is operational;
- IV. Display firmware version and update to latest version, when required.

A700-2.9.2 Field Repair and Upgrades

Display alignment shall be easily adjusted, without exchanging internal parts, to work on the center median, left, or right side of the roadway.

Display shall be comprised of modular components that can be exchanged easily in the field without removal of the sign from the mounting pedestal or mast. The following components shall be field replaceable:

A700-2.9 Serviceability (Continued)

- I. Radar unit;
- II. Controller board;
- III. Fuse block(s);
- IV. Communication options such as modems or adapters;
- V. LED Display panels;
- VI. GPS time-reference antenna;
- VII. AC power supply, fuses, internal cabling;
- VIII. For solar power packages, the solar controller, battery and panels

The ESFS shall be upgradeable in the field to add a GPS time-reference antenna and/or to add support remote communication via Ethernet, cell-modem, or other method.

A700-3 Environmental

The electronic display shall meet the environmental requirements as described in Section A615 of FDOT Minimum Specifications for Traffic Control Signals and Devices manual. The display shall be designed and constructed in a manner that prohibits fogging, frost, or condensation from forming within the dynamic portion of the sign.

A700-4 Warranty

The ESFS shall have a manufacturer's warranty covering defects in assembly, fabrication, and materials for five (5) years from date of receipt from manufacturer. In addition, the manufacturer's warranty on the LEDs, comprising the display segments, shall be ten (10) years from date of receipt of the ESFS.

The manufacturer at no charge shall provide replacement components for in-warranty repairs when provided in exchange for the part being replaced. Outbound shipping costs for warranty replacements signs/parts shall be paid for by the manufacturer.

All control software and/or firmware updates shall be available to the County at no additional charge, during the warranty period. Manufacturer shall supply technical telephone support at no extra charge to the County.

A700-5 Certificate of Compliance

For MDPW QPL approval, the Manufacturer shall provide to Miami-Dade County a Certificate of Compliance on company letterhead. The document shall certify that all components of the ESFS fully comply with the specifications and all other requirements as specified herein or have been amended to comply with this specification and will be fully honored, by the Manufacturer.

A700-6 Conflicts and Waiver

In the event the Manufacturer takes an exception to full compliance, it shall be clearly specified in writing, any non-compliance to the specifications and/or requirements. MDPW TSS, at its discretion, has the right to waive in writing, any exception(s) of non-compliance, if in the best interest of the County. Failure by the Manufacturer to note non-compliance(s) shall therefore waive any rights the Manufacturer may have with conformance to the specified requirements, by the County.

A700-7 MDPW QPL Review Process

The Manufacturer shall follow the requirements, as noted on the following pages, for MDPW QPL approval for all ESFS.

A700-7.1 Compliance Requirements and QPL Submittals***A700-7.1.1 Product Samples***

As a requirement for MDPW QPL testing and acceptance portion of the ESFS, the Manufacturer/Vendor shall donate to Miami-Dade County a minimum of two (2) ESFS for testing and field evaluation. The length of the actual field testing portion shall be a minimum of three (3) months from the field turn-on date. Unless the device is deemed unacceptable, by the County, it shall remain the property of MDPW, at no cost to the County. In the event the device is not accepted, it shall be returned to the Manufacturer/Vendor, by the County.

Failure by the Manufacturer to comply with all QPL testing/evaluation requirements shall deem the device not approved for installation/use within the jurisdictional boundaries of Miami-Dade County, Florida.

Additional QPL process information and requirements can be found at:

http://www.miamidade.gov/pubworks/traffic_signals.asp

A700-7.1.2 Shop Drawings

The Manufacturer shall provide complete shop drawings on ESFS sign along with additional drawings showing various mechanical sign support(s) for the installation of both solar power and ac systems for pedestal installations, etc.

A700-7.1.3 Manuals and Schematic Drawings

The Manufacturer shall provide Installation, Operation and Maintenance Manuals along with electrical and electronic schematic drawings, as noted:

- A) Installation Manuals: 2 required
- B) Operation Manuals: 3 required
- C) Maintenance Manuals: 2 required
- D) Schematic Drawings: 2 required

A700-7.1 Compliance Requirements and Submittals (Continued)

A700-7.1.4 Parts List with Pricing

The Manufacturer shall supply a complete list of parts for the ESFS along with a current pricelist for said parts.

A700-7.1.5 Warranty Documentation

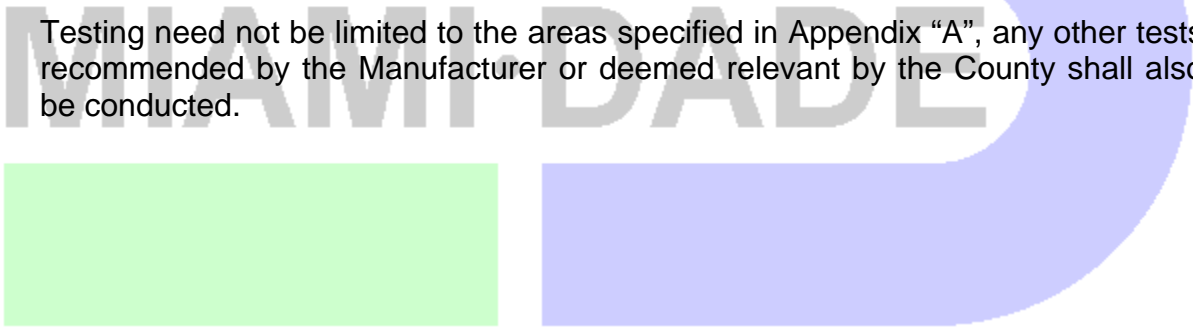
The Manufacturer shall submit complete product warranty information.

A700-7.2 Product Testing and Specification Verification

The ESFS shall be tested and evaluated at the County's Public Works Department, Traffic Signals & Signs Division Electronic Shop, 7100 NW 36 Street Extension, Miami, Florida 33166.

The two (2) product samples provided by the Manufacturer, in addition with any in-house equipment tests conducted by the County, shall require field site installation, operation, data and scheduling functional testing along with specification verification. This shall require a qualified representative of the sign Manufacturer/Vendor to be present along with various County TSS and TED staff. A mutually agreed date and time shall be scheduled between all parties involved.

Testing need not be limited to the areas specified in Appendix "A", any other tests recommended by the Manufacturer or deemed relevant by the County shall also be conducted.



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APPENDIX "A"

Product Testing and Specification Verification

The Manufacturer/Vendor shall conduct and/or demonstrate with Miami-Dade County the following field tests and/or operations for verification and conformance with the specification:

Sign Operation		
	Feature	Verification
1)	Real-Time Connection	Demonstrate the real-time wireless connection to the ESFS.
2)	Test Sequence Display	Run a test sequence that will initiate a display digit roll-up test to verify that the device is operating properly.
3)	Vehicle Detection	Demonstrate that the ESFS is set to detect only approaching traffic
4)	Instant "ON"	Demonstrate that the display will activate within Perception-Response Time (PRT) per MUTCD Table 2C-4. Guidelines for Advance Placement of Warning Signs to allow motorists to see and react to the ESFS.
5)	Minimum Display Speed	Demonstrate that the ESFS will begin displaying the speed once the driver speed reaches this threshold
6)	Violation Alert	<p>A. Demonstrate that the display will "flash" the driver's speed once the radar detects the pre-set violation alert speed threshold;</p> <p>B. Demonstrate that the display will "flash" the "SLOW DOWN" message once the radar detects the pre-set Slow Down speed threshold;</p> <p>C. Demonstrate that the display will "blank-out" or display "SLOW DOWN" message once the radar detects the pre-set high speed threshold.</p>
7)	Visibility	Demonstrate that the ESFS will be fully visible in all lighting conditions; and that the display will have high contrast and visibility.

Sign Scheduling		
	Feature	Verification
1)	Schedule creation	Demonstrate the ability to set up sign schedules while disconnected from sign.
2)	Creating operating modes	Demonstrate the ability to support at least twenty (20) unique operating modes. A. Display "On" and "Off" control; B. Stealth mode (data collection "On", display "Off"); C. At least five (5) modes with unique school and non-school speed limits, minimum display, violation alert, Slow Down alert and high-speed cut-off speed thresholds, "On/Off" times, and data collection times.
3)	Daily schedule	Demonstrate the ability to support at least sixteen (16) sign operating mode changes per day.
4)	Weekly Schedule	Demonstrate the ability to support at least five (5) weekly schedules with different operating schedules for each day of the week.
5)	Exception Days	Demonstrate the ability to support planned and unplanned events by date and time to support special events, construction zones, and in the case of school zones, non-school days, early release days, and holidays.
6)	Yearly Schedule	A. Demonstrate the ability to support at least five (5) unique annual school schedules; B. Demonstrate the ability to support two (2) year schedules for non-school applications.
7)	Miami-Dade County School schedules	Demonstrate the ability to support operating schedules for existing and planned school schedules in Miami-Dade County and planned events in non-school installations.
8)	Future Capacity	Explain how the sign features and functionality will be capable of handling up to 500 unique schedules.
9)	Ease of schedule creation	Demonstrate the ability to create new schedule and schedule components by copying and editing existing modes and daily, weekly, and annual and two (2) year schedules.
10)	Sign Scheduling	A. Demonstrate that schedules are easily transferrable between notebooks to support field operations and support; B. Demonstrate the ease of updating sign schedules in the field.

Data Collection Verification and Analysis		
	Feature	Verification
1)	Data Collection	Verify data is being collected as programmed and collects the date, time, and speed of each target vehicle.
2)	Data Storage	Verify data storage will support a minimum of 4500 target vehicles per day for thirty-one (31) calendar days.
3)	Data Retrieval	Demonstrate downloading data to notebook PC.
4)	Data Management	A. Demonstrate the option of clearing or saving data currently in the ESFS; B. Demonstrate the ability to utilize circular data collection as well as keeping data once the memory is full.
5)	Data Accessibility	Show that the data is available in .csv format on the PC.
6)	Data Analysis & Reporting	Demonstrate the traffic data analysis and reporting capabilities of the software.
7)	Data Windowing	Demonstrate the ability to select, analyze, and report a subset of the data.

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Sign Set-up and Operation		
	Feature	Verification
1)	Sign Set-up	Demonstrate Sign Set-up: A. Date and time-of-day; B. Real- time clock correction factor; C. User-selectable alpha-numeric identification code of at least twenty-two (22) characters to allow unique identification of each sign location; D. Wireless programming of sign operating schedule.
2)	Display Activation	Demonstrate that the display does not display vehicles traveling less than the minimum display speed threshold.
3)	Violation and Slow Down Message Alert	A. Demonstrate that the display digits will “flash” while displaying a speed which is in excess of a pre-set speed threshold to assist in getting the attention of the speeding driver; B. Demonstrate that the “SLOW DOWN” message will display at a preset speed threshold that is higher than the speed threshold set for flashing the display and will alternate with the driver’s speed.
4)	High-Speed Cut-off	Demonstrate that the driver’s speed will no longer display once the high-speed cut-off speed is reached.
5)	External Device(s) Control	A. Demonstrate that the display can operate up to two (2) external devices to trigger at different speed thresholds or be controlled by time-of-day to support integration of external flashers or other devices; B. Demonstrate powering of up to two (2) AC or DC devices or flashers upon speed threshold or schedule; C. Show that external contact-closure input can switch between two (2) programmed speed thresholds if scheduling function is not used; D. Show that external devices can be enabled to operate either in: unison; alternating with each other; or flashing in synchronization, with the violation alert condition.

Wireless and Remote Communication		
	Feature	Verification
1)	Communication	Demonstrate the ability to connect to the ESFS at the install site and from a remote office location and perform sign set up, diagnostics, and programming functions.

