



**LED Task Specific Embedded  
Dynamic Message Sign  
Full Color LED  
Sample Procurement Specification  
Messenger 5000 Series**



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SES AMERICA  
SAMPLE PROCUREMENT SPECIFICATION  
**INTELLIGENT TRANSPORTATION SYSTEM**  
**GRID POWERED DYNAMIC MESSAGE SIGNS**  
**TSDMS EMBEDDED M5000 SERIES FULL COLOR**

## **1 Introduction**

Task Specific DMS (TSDMS) are used for a wide range of applications although primarily as embedded Travel Time DMS or Toll Rate Indicators.

TSDMS equipment described in this document must comply with the latest versions of the following industry and project standards and requirements;

- NEMA TS4
- NTCIP 1203 Version 2.39
- DOT general specifications and requirements.

This document describes several LED Display board sizes (16x16 pixel 20mm and 9x10 pixel 33mm) in full color focused on the special requirements of embedded DMS. The exact sizes and configurations of TSDMS required for the project and their specific options are listed in Appendix A – Bid Item Configuration Sheet.

## **2 TSDMS Equipment**

### **2.1 TSDMS Sign Housing**

- 2.1.1 The TSDMS housing shall be constructed to have a neat, professional appearance. The housing shall be constructed of aluminum alloy 5052-H32 with a minimum thickness of 0.090 inch (2.29 mm). Where extrusion is used for TSDMS structural members such as frames or channel, the extrusions shall be constructed of either 6061-T6 or 6005 T-5 aluminum.
- 2.1.2 The TSDMS housing shall be capable of being either surface mounted to or embedded in a MUTCD compliant static sign. The housing must provide safe and convenient access to all sign equipment, components, assemblies and other materials. . Internal components shall be removable, transportable and capable of being installed by a single technician, and shall be modular in design so that it is not necessary to remove or replace discrete components in the field to analyze and/or correct a failure.
- 2.1.3 The housing shall protect internal components from rain, ice, dust and corrosion in accordance with NEMA enclosure Type 3R standards, as described in NEMA Standards Publication 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
- 2.1.4 The TSDMS housing shall contain small weep holes for draining any water that may accumulate due to condensation. Weep holes shall be screened by a non-corrosive material to prevent the entrance of insects and small animals.
- 2.1.5 Housings shall be designed with an interior construction utilizing a non-corrosive mounting system in which to mount the display modules. The mounting process shall be designed to withstand and minimize effects from vibration to the display modules and/or electronics.



2.1.6 The TSDMS housing must be equipped with mounting tabs in which to attach the TSDMS housing to the static sign structure or static sign as approved by the engineer. All mounting components and TSDMS housing configurations must meet AASHTO requirements. Several TSDMS may be mounted on a single static sign. The mounting brackets and interfaces shall not interfere with and shall be designed to allow easy installation of all signs.

2.1.7 The housing must be slim and shall not exceed 5 inches. If the static sign needs to be cut to install an embedded TSDMS, the front face surface of the TSDMS housing shall not protrude more than 4 inches from the front surface of the static sign.

## 2.2 **Optional TSDMS Angle Mechanism**

If required by the approving engineer, the TSDMS must be designed to be easily adapted to an optional Angularity Mechanism allowing for fine tuning of the TSDMS viewing angle in relation to the roadway. The angularity mechanism must provide a range of adjustment between 0 and 12 degrees. Please refer to “Bid Item Configuration Sheet” in Appendix A.

## 2.3 **Front Access TSDMS Housings**

2.3.1 Front Access TSDMS housings and all associated equipment and materials shall be designed and constructed so that all maintenance and repair is performed from the outside through the front access door panels. Doors or panels required to be moved out of their normal closed position for maintenance or repair shall not impede access of maintenance personnel to the internal components of the TSDMS.

2.3.2 Front Access Door TSDMS shall be equipped with the following features;

- Single or multiple horizontally hinged rigid door panels, each of which contains a full-height section of the LED display matrix and will open from top to bottom.
- Each door is equipped with a retaining latch, slide or lanyard that will hold the door open to a minimum of 90 degrees.
- Each door is equipped with a locking mechanism to ensure a water tight seal against the inner door opening gasket.
- Each door will seal against flat foam or other type gasket designed to seal the door to NEMA 3R standards through the life of the TSDMS. Gasket material will also conform to NEMA TS4 standards.

2.3.3 Back surface of the Front Access TSDMS will utilize the following features;

- Rear panels will be bolted to the TSDMS and watertight sealed to block sun light from escaping through the front face area of the TSDMS.
- Cable access connections will be positioned in such a way as to not interfere with installation of the TSDMS housing.
- Each TSDMS will be equipped with one or more enclosure vents to allow pressure buildup within the sign to escape.



## 2.4 Front Face Construction

2.4.1 For all types of TSDMS, the front face construction shall consist of a aluminum mask with a layer of weather tight, ultraviolet protected, non-diffusing polycarbonate (non-matte finish) sheeting attached securely to the inside surface of an aluminum inner door panel.

2.4.2 The front of the sign housing shall be completely surrounded by an area designated as a contrast shield to improve legibility. This shield shall be bolted to the sign or be an integral part of the sign housing and front face design. Either design will not allow light leaks occur. The pixel apertures in both the mask and inner front door panels shall provide openings directly in front of each LED pixel grouping. Each opening shall be of sufficient size as to not interfere with LED light output from the road viewing angles stipulated for the display. The sign face shall be designed to minimize bowing and shall not distort in a manner that adversely affects LED message legibility.

The sign face shall be designed in such a way that mounting fasteners are hidden from view by oncoming motorists.

## 2.5 Optional Limited View Configuration

It may be required that the TSDMS display is seen by some traffic lanes only. In this case, a limited view design shall be provided.

For a limited view TSDMS, the cone of vision of each pixel shall be limited in one horizontal direction (right or left), while the other side remains compliant with the requirements of this specification. The manufacturer must submit for approval a clear design description and explanation of how the angular performance is achieved.

## 2.6 Exterior Housing Finish

2.6.1 To reduce glare, increase contrast ratio and provide a long-lasting professional appearance, the entire TSDMS housing shall be painted or powder coated with a matte black finish to a minimum standard of AAMA 2604-05 specifications.

2.6.2 All welds shall be neatly formed and free of cracks, blow holes and other irregularities. The housing shall have a smooth, uniform finish.

## 2.7 Lifting Hardware

For TSDMS exceeding 50lbs, galvanized steel lifting eyebolts shall be attached to the top of the TSDMS housing for moving and installation purposes. All mounting points for eyebolts shall be sealed to prevent water from entering the TSDMS housing. Lifting hardware, as well as the sign housing, shall be designed to prevent damage or undue stress to the TSDMS during shipping or temporary storage prior to installation on the TSDMS support structure.



2.8 **Ventilation**

2.8.1 No ventilation shall be required for the electronic components. The sign shall operate without any exhaust or intake fans or positive pressure ventilation systems.

3 **Display Properties**

The optical system shall provide a uniform display across the sign, so that there is no visible difference in luminous intensity from any one pixel to another pixel, under any brightness level.

The LED display module will be created by pixels utilizing one LED of each of the following colors: RED, GREEN and BLUE.

3.1 **Contrast Ratio**

3.1.1 TSDMS shall be constructed in accordance with contrast ratio requirements as defined in NEMA TS4 Section 5.2.

3.1.2 Contrast Ratio is calculated as follows:

$$C_r = (L_{on} - L_{off}) / L_{off}$$

Where:

$C_r$  = contrast ratio

$L_{on}$  = measured luminance from the display with the pixels active or on, at the specified sign illuminance.

$L_{off}$  = measured luminance from the display with the pixels inactive or off, at the specified sign luminance.

3.1.3 Based on this formula, the TSDMS shall meet a contrast ratio for each color, when measured on-axis (0° horizontal and 0° vertical in relation to the center of the sign face) under any illumination greater than 400 and lower or equal to 40,000 lux by a solar simulator. The contrast ratio shall be measured at the front of the sign in its final position with any component that could impede or otherwise affect the light output and background luminance (such as the front face, mask, and polycarbonate) in place. The minimum requirements to be met for each color as specified by NEMA TS4 is;

Color	Red	Yellow	White-Yellow	Green	Blue	White
Minimum Contrast Ratio requirements NEMA TS4	2,5	6	8,5	3	1	10



3.1.4 The TSDMS manufacturer must submit a test certificate from an independent laboratory to certify compliance with this requirement.

**3.2 Cone of Vision**

3.2.1 The cone of vision for the RED, GREEN, and BLUE LEDS must be 30 degrees as defined by NEMA TS4.

3.2.2 The TSDMS manufacturer must submit a test certificate from an independent laboratory to certify compliance with this requirement.

**3.3 Luminance Intensity Requirements**

3.3.1 The luminance intensity shall be measured at the front of the sign in its final position with any component that could impede or otherwise affect the light output (such as the front face, mask, and polycarbonate) in The TSDMS manufacturer must submit a test certificate from an independent laboratory to certify that the place.

3.3.2 Luminance intensity for the LED Display module illuminating the color WHITE is a minimum of 12,400 cd/m<sup>2</sup> under 40,000 Lux. The minimum requirements to be met are specified below by color.

Color	NEMA TS4 Min. Requirement cd/m2
Red	3100
Green	3720
Blue	1240
Yellow	7440
White	12400
White- Yellow	10540

**3.4 Display Characteristics**

3.4.1 All provisions of NEMA TS 4 Section 5.6.1 and 5.6.2 shall apply for fonts and alphabets. Each sign shall be able to display a message composed of any combination of ASCII characters 20(hex) through 7E (hex) inclusive.

3.4.2 The sign displays shall support text and graphic displays in accordance with the requirements of NTCIP.

3.4.3 TSDMS must support additional fonts based on client requirements. As the TSDMS are generally designed for a specific purpose, the TSDMS must provide industry standard NTCIP compliant fonts capable of displaying the client information be it text or graphical in nature.

3.4.4 For a Full Matrix requirement, the TSDMS display area shall conform to the following display characteristics and requirements:





**TABLE 2:**

**DISPLAY CHARACTERISTICS**

Requirement	Full Color			
Pixel Pitch (max.)	33 mm		20 mm	
Character Height	18 in	12 in	18 in	12 in
Horizontal Spacing (pixels - min.)	2	2	4	3
Vertical Spacing (pixels - min.)	4	4	6	4
Default Font Array	14x10	9x6	23x15	15x10
Legibility Distance	1000 ft	700 ft	1000 ft	700 ft

**3.5 Display Change Time**

The time required to clear any display and post any new display shall not exceed 500 milliseconds.

**4 Optical Components**

**4.1 Display Module Design**

- 4.1.1 Each display module shall consist of only one electronic assembly that contains all of the LED's, LED drivers, memory, microcontroller and network elements to control the LED's.
- 4.1.2 All like-size modules shall be fully interchangeable within a sign or different types of signs of the same pitch from the same TSDMS manufacturer. The same type of display board must be used for either character matrix, line matrix or full matrix TSDMS in order to reduce spare part inventory and maintenance cost.
- 4.1.3 A dedicated DIP switch must be available at the rear of each display module to adjust the brightness for each display module independently of the other modules.
- 4.1.4 The replacement of a display module shall be possible without the use of any tools, drawings or diagnostic equipment.
- 4.1.5 All the connections between boards shall be made with rugged, positive locking, quick release, and coded connectors. Their size and shape shall be such that they are easy to manipulate.
- 4.1.6 Each display board shall contain one DC power, one data "IN" communication connector and one data "OUT" communication connector..
- 4.1.7 The full color LED display board must be automatically addressed and there will be no switches permitted to set the board address.



## 4.2 LEDs

All RED, GREEN, and BLUE LEDs provided for the manufacture of the TSDMS shall conform to the following requirements:

### 4.2.1 Color LEDs

- 4.2.1.1 LED package style shall be surface-mount LEDs. Through-hole flush-mount and through-hole standoff LEDs will not be accepted.
- 4.2.1.2 Red LEDs shall utilize AlInGaP semiconductor technology and shall emit red light that has a peak wavelength of 618-630nm.
- 4.2.1.3 Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 519-539nm.
- 4.2.1.4 Blue LEDs shall utilize InGaN semiconductor technology and shall emit a true blue light that has a peak wavelength of 460-480nm.
- 4.2.1.5 The TSDMS manufacturer will assure color uniformity and consistency by requiring the display boards be manufactured using only LEDs from two adjacent color bins and two adjacent intensity bins. LEDs shall be nominally rated for 100,000 hours of operation under 100% intensity (at manufacturer's stated current) under NEMA TS-4 environmental conditions (-34°F / +165°F). (-34°C / +74°C).
- 4.2.1.6 LEDs shall have a nominal viewing angle of 30 degrees (15° measured from the longitudinal axis of the LED). The use of optical enhancing lenses to achieve the specified viewing angle is not allowed and will be cause for rejection.
- 4.2.1.7 Each display module shall include a label indicating the intensity and color bin of the LEDs used.
- 4.2.1.8 The hardware design of the LED driver circuitry shall be such that the LED current shall be hardware restricted so it can never exceed 75 % of Maximum Forward Current as defined by the LED Manufacturer. These criteria must be met even if there is a software failure in the system.
- 4.2.1.9 The change of brightness must occur simultaneously on all display modules in the sign.

## 4.3 Pixel Sizing and Spacing

- 4.3.1 Each color LED module shall contain a minimum of one red, one green, and one blue surface mounted LED for each pixel.
- 4.3.2 The pixel array shall be a minimum of sixteen (16) pixels high by sixteen (16) pixels wide for display modules with 20mm pixel pitch,
- 4.3.3 The pixel array shall be a minimum of nine (9) pixels high by ten (10) pixels wide for display modules with a 33mm pixel pitch.
- 4.3.4 The design of the module using surface mount LEDs and front face arrangement must be such that no cooling fans or ventilation are required to maintain normal operation of the TSDMS within the NEMA TS4 environmental operating range of -34° C through 74°C.
- 4.3.5 Each pixel shall contain the quantity of discrete LEDs needed to output white colored light at a minimum luminous intensity of 12,000 candelas per square meter when measured using a photometric meter through the TSDMS front face panel assembly.
- 4.3.6 Each pixel shall also be capable of displaying amber colored light with a minimum luminous intensity of 7,440 candelas per square meter when measured using a photometric meter through the TSDMS front face panel assembly.



## **5 Main Power Supply and Distribution**

### **5.1 Power Supplies**

- 5.1.1 Power supplies shall operate from 120 VAC 60 Hz . The LED displays shall be operated at a low internal DC voltage not exceeding 24 VDC. Sign components that operate on DC voltages shall have power connections that are unique and keyed.
- 5.1.2 Power supplies shall be solid state electronic with regulated outputs.
- 5.1.3 Optional additional power supplies shall provide N+1 redundancy. Power supplies shall be rated such that if one supply fails, the other(s) can operate the entire TSDMS under nominal load conditions. Failure of a single power supply shall not cause a failure of the other power supplies. Power supplies shall meet NEMA TS-4 temperature requirements operating from -30°F to +165°F (-34°C to +74°C). Power supplies shall have over-voltage protection devices that supplement the TSDMS assembly over voltage, surge and transient voltage protection devices. This option is mandatory if specified in the bid item configuration sheet at the end of this document.
- 5.1.4 Power supplies shall be short circuit protected by turning the DC power off and shall reset automatically.
- 5.1.5 Power supplies shall be UL listed and RoHS compliant.
- 5.1.6 Power supplies shall be installed with the terminals/connectors unobstructed by hardware or mounting brackets. The operator shall be able to read the terminal designations and measure voltages without removing the power supply or obstructions.
- 5.1.7 Power supplies and associated electronics must be capable of being installed in either the DMS, an auxiliary power cabinet or at the remote TSDMS controller cabinet.
  
- 5.1.8 The regulated DC power supplies shall conform to the following specifications:
  - 5.1.8.1** Operating input voltage range shall be a minimum of 90 to 264 VAC.
  - 5.1.8.2** Operating temperature range shall be a minimum of -30°F to +165°F (-34°C to +74°C).
  - 5.1.8.3** Maximum output power rating shall be maintained over a minimum temperature range of - 30°F to +140°F (-34°C to +60°C).
  - 5.1.8.4** Power supply efficiency shall be a minimum of 80%.
  - 5.1.8.5** Power factor rating shall be a minimum of 0.95.
  - 5.1.8.6** Automatic output shut down and restart shall occur if one of the following faults occur; over temperature, over-voltage, short circuit, or over-current.



## 5.2 Energy Efficiency

TSDMS shall be designed to be energy efficient and to consume the minimum amount of power in order to save operation costs. The maximum power consumption of the sign components shall be as follow:

- Controller = 5 Watts
- 16x16 pixel 20mm RGB Display board nominal = 15 W, at maximum brightness = 50 W
- 9x10 pixel 33mm RGB Display board nominal = 12 W, at maximum brightness = 34 W
- The supplier must provide calculation to justify the power consumption of each TSDMS, based on the following:
  - Display at daily brightness (40% of pixels - ON)
  - Controller and other system devices i.e. light sensors, driver boards - ON
  - No ventilation shall be required for normal operation

## 5.3 Surge Protection

- 5.3.1 TSDMS equipment shall be protected by a double-pole, thermal-magnetic breaker. Additional protection shall be provided for overvoltage and lightning on both the AC and communication circuits. This protection can be installed in either the TSDMS housing or in the TSDMS controller cabinet location.

# 6 TSDMS Controller

## 6.1 General Requirements:

- 6.1.1 TSDMS shall be controlled by a microprocessor based sign controller (designed specifically for TSDMS/DMS usage) capable of operating and monitoring all sign functions.
- 6.1.2 The controller must allow the user to operate the sign via 3 different interfaces: from the front panel touchscreen, web-based interface, and NTCIP central software.
- 6.1.3 The sign controller shall be housed in a durable enclosure and shall be 19 inch EAI rack mountable. Controllers shall be capable of driving all sign components via a RS485 network and be fully NTCIP compliant.
- 6.1.4 Physical requirements of the controller are;

### 6.1.4.1 Front Panel Indicators

The controller shall provide LEDs to indicate the status of the following items:

- AC Power,
- DC Power,
- Battery Status,
- CPU Status,
- CPU Fault Status,
- Ethernet Link and Activity Status,
- RS232 Receive and Transmit Activity,
- RS485 Receive and Transmit Activity,
- Digital Input Status,
- Digital Output Status.



**6.1.4.2** The front panel provides the following:

- Two (2) Ethernet 10/100 full-duplex ports,
- Two (2) RS-232 serial ports,
- Two (2) RS-485 serial ports,
- Four (4) digital outputs,
- Four (4) digital inputs,
- One (1) reset push button,
- Power On/Off switch,

**6.1.4.3** The controller must be equipped with a Full Color Touch Screen utilizing a WYSIWYG display of a minimum size 4 5/8 inches width x 3 1/2 inches high.

**6.1.4.4**

All electrical connections between the controller and subassemblies located within the Controller Cabinet and the TSDMS are provided on the front panel to avoid maintenance access problems associated with connectors located at the rear of the controller.

6.1.5 Rugged, keyed connectors must be used to prevent misplacement of the connectors.

## **6.2 Electrical Panel**

Controller Cabinet Electrical Panel Circuit breakers of the appropriate size shall be provided with each panel and wiring shall be rated and in accordance with appropriate articles of the NEC and the anticipated loads that will be experienced by any equipment within the cabinet and the branch circuit feeding the sign case.

## **6.3 Digital I/O**

The controller must be equipped with a minimum of 4 Digital inputs capable of accepting dry contact closures. These digital inputs can provide status inputs from items such as door switches. These inputs can also trigger software functions such as displaying preprogrammed messages. The controller shall provide a minimum of 4 Digital Outputs capable of driving relays or commands to external devices.



#### 6.4 **Clock**

6.4.1 The TSDMS controller shall contain a computer-readable time-of-year clock with a lithium battery or equivalent backup capable of operating the clock properly without external power.

6.4.2 The clock shall be set by the TSDMS controller microprocessor and shall be accurate to within 1 minute per month.

#### 6.5 **Front Panel User Interface**

6.5.1 The TSDMS controller shall be equipped with a full color, front panel touch screen LCD display. This user interface shall be capable of:

6.5.1.1 Display sign current message in WYSIWYG format including blinking function, multi-page messages, flashers, etc.

6.5.1.2 Allow display of all available TSDMS display test patterns.

6.5.1.3 Perform all diagnostics testing of various system components, including pixels, power systems, sensors, etc.

6.5.1.4 Activate a blank message or other messages stored in non-volatile memory of the TSDMS Controller.

6.5.1.5 Control mode selection (Remote or Local).

6.5.1.6 Select automatic or manual brightness mode of operation.



**6.5.1.7** The GUI of the front panel touch screen shall meet the following requirements:

- Provide a main menu with icons used to select the main controller functionalities like the display screen, maintenance screen, communication and configuration screens. ...
- Display in real time the exact messages (graphic or text) displayed on the TSDMS. In the case where the controller is connected to several DMS, all TSDMS message displays shall be available
- Display the brightness level
- Display manual or automatic mode
- Display symbols portraying major functionality like power availability, communication, light sensor status, stored event logs, configuration upload and download as well as Navigation buttons to navigate from one screen to another
- A specific screen to display communication configuration and sign address (IP addresses)

## **6.6 Controller Software**

6.6.1 The TSDMS controller software at minimum shall support NTCIP 1203 V2.39 and be backward compatible as noted in Section 9 of this specification.

6.6.2 The TSDMS controller shall be configurable by the user to define the number of LED display elements (pixels) faults before the controller blanks the sign.

6.6.3 Provide a remote capable web-server interface that will allow remote interface of all front panel user functions.

## **6.7 Display Presentation**

6.7.1 The sign controller shall control the display modules to create the desired message on the sign. At a minimum, the signs shall be able to display the characters as described in NEMA sections 5.6.1 and 5.6.2.

## **7 Dimming System:**

7.1.1 TSDMS shall be provided with a display intensity control system. In case of locations with multiple TSDMS, only one light sensor system shall be provided and connected to the controller. All TSDMS shall dim simultaneously and shall have the same brightness level at any given time.

7.1.2 The system shall contain a minimum of two ambient light sensors to measure light levels and report the levels to the display control system. The sensors shall be positioned so that one sensor shall monitor the light levels on the front of the TSDMS, a second sensor shall monitor the light striking the back of the TSDMS.

7.1.3 The levels reported to the sign controller shall be processed so that the highest light level sensed will be considered the controlling level and shall be compared against a table containing a minimum of 6 configurable intensity levels.

7.1.4 The intensity levels shall be user configurable.

7.1.5 Each intensity level shall consist of an entry and exit value that allows the overlapping of levels to prevent display fluctuation with minor ambient light changes and flickering of the display during intensity level changes.



7.1.6 The dimming system shall conform to the following requirements:

- At a minimum, the front facing photocell shall be enclosed within the sign case with a transparent covered window that allow light to pass from the exterior of the sign case to the surface of the photocell. The rear facing sensor can either be placed within the sign housing or be a remote sensor positioned in such a way to gather light input exposed to the rear of the TSDMS. Sensors shall be capable of being continually exposed to direct sunlight without impairment of performance.
- Dimming Levels - Manual and automatic dimming modes shall be provided enabling the user to select the desired mode of operation.

## **8 Diagnostics and System Failure**

### **8.1 Failure Reports**

The sign controller shall implement the status reporting objects required by NTCIP and have them available from a poll from central or the Local Connection. Sign controller shall log error conditions and make them available for future reporting.

### **8.2 Power Interruptions**

The controller's configuration and controller state must be saved in non-volatile memory. In the event of a power interrupt, the controller must resume operation once power is restored.

Upon recovering from a power interruption, the controller shall report to the central computer that it has recovered from a power-interruption.





## 9 NTCIP Communication Requirements

Each NTCIP Component covered by these specifications shall implement the most recent versions of the standard. At a minimum, the following MIB Object definitions shall be followed for each NTCIP section required for compliance to this specification. When viewing the tables, supported items are required.

### 9.1 Overall NTCIP Compliance

Standard	Name	Recommended version	Supported version	Comments
<b>Base standards</b>				
1102	OER	1.15	1.15	
1103	TMP	2.16	2.16	
8004	SMI	2.12	2.12	
<b>Device Data Dictionaries</b>				
1201	Global object definition	2.32	2.32	
1203	TSDMS	2.35	2.35	
<b>Subnetwork profiles</b>				
2101	PMPP/RS232	1.19	1.19	-
2102	PMPP/FSK	1.09	1.09	-
2103	PPP/RS232	1.09	1.09	-
2104	Ethernet	1.11	1.11	-
<b>Transport profiles</b>				
2201	Transportation	1.15	1.15	-
2202	Internet	1.05	1.05	-
<b>Application profiles</b>				
2301	STMF	1.08	2.12	1.08 refers to obsolete standards

### 9.2 NTCIP 1101:1996 (V01.12) Simple Transportation Management Framework, December, 2001 with Amendment 1 v08

- Must be supported (replaced by NTCIP 1102, 1103 and 8004).

### 9.3 NTCIP 1102:2004 (V01.15) Octet Encoding Rules (OER) Base Protocol, October, 2005

- Must be supported (replaced by NTCIP 1102, 1103 and 8004).



9.4 NTCIP 1103: 2009 (V02.16) Transportation Management Protocols (TMP), March, 2009

NTCIP 1103: 2009 (V02.16) Transportation Management Protocols (TMP), March, 2009			
Object group/Section	Support		Comment
		MIB Detail	
<b>Section 3: SNMP</b>	<b>Supported</b>		
<b>Section 4: SFMP</b>	<b>Not Supported</b>		
<b>Section 5: STMP</b>	<b>Not Supported</b>		
<b>Section 7: Logical names</b>	<b>Not Supported</b>		<b>Center to Center communication</b>
<b>Section 8: Security</b>	<b>Supported</b>		
<b>A.2: Objects for SFMP</b>	<b>Not Supported</b>		
<b>A.3-A.5: Objects for STMP</b>	<b>Not Supported</b>		
<b>A.6: Logical names</b>	<b>Not Supported</b>		
<b>A.7: Report parameters</b>	<b>Supported</b>		
		maxEventClasses	Max = 65
		maxEventLogConfig	Max = 255
		maxEventLogSize	Max = 1024
<b>A.8: Security objects</b>	<b>Supported</b>		
		communityNameMax	Max = 16

9.5 NTCIP 8004: 2008 (V01) Structure and Identification of Management Information (SMI), May, 2008

- Must be supported.



9.6 NTCIP1203:2007 (V2.35) Object Definitions for Dynamic Message Signs (TSDMS), March 2007

NTCIP1203:2007 (V2.35) Object Definitions for Dynamic Message Signs (TSDMS), March 2007			
Object group	Support		Comment
<b>5.2 Sign configuration and capability</b>	<b>Supported</b>		
<b>5.3 VMS configuration</b>	<b>Supported</b>		
<b>5.4 Font definition</b>	<b>Supported</b>		
		numFont	Max = 16
		maxFontCharacters	Max = 255
		fontMaxCharacterSize	Max = 64
<b>5.5 MULTI Configuration</b>	<b>Partial</b>		
		defaultJustificationLine	Supported values: 2..4
		defaultCharacterSet	Support value 2 (height bits)
		DMSMaxNumberPages	Max = 10
		DMSMaxMultiStringLength	Max = 1024
<b>5.6 Messages</b>	<b>Supported</b>		
		DMSNumPermanentMsg	Max = 255
		DMSMaxChangeableMsg	Max = 255
		DMSMaxVolatileMsg	Max = 255
		DMSMaxMultiStringLength	Max = 1024
<b>5.7 Sign Control</b>	<b>Supported</b>		
<b>5.8 Illumination/Brightness</b>	<b>Supported</b>		
		DMSIllumControl	timer (value 3) not required. V1 modes still supported if required
<b>5.9 Scheduling Action</b>	<b>Supported</b>		
		numActionTableEntries	Max = 255
<b>5.10 Auxiliary I/O</b>			<b>See NTCIP 1201</b>
<b>5.11.1 Sign Status: Core Status</b>	<b>Partial</b>		
		DMSCurrentSpeed	Not required
		DMSCurrentSpeedLimit	Not required
<b>5.11.2 Sign Status: Status Error</b>	<b>Partial</b>		
		Climate status objects	Not required
		pixelStatusTable	



		Lamp status objects	Not required
		Drum status objects	Not required
<b>5.11.3 Sign Status: Power Status</b>	<b>Partial</b>		
		Fuel and engine status objects	Not required
<b>5.11.4 Sign Status: Temperature Status</b>	<b>Supported</b>		
<b>5.12 Graphic definition</b>	<b>Partial</b>		
		Transparent color	
		DMSGraphicMaxEntries	Max = 255
<b>Section 3 MULTI TAGS</b>			
<b>6.4.1 Color background [cb]</b>	<b>Supported</b>		
<b>6.4.2 Page background color [pb]</b>	<b>Supported</b>		
<b>6.4.3 Color foreground [cf]</b>	<b>Supported</b>		
<b>6.4.4 color rectangle [cr]</b>	<b>Supported</b>		
<b>6.4.5 Field [fx,y]</b>	<b>Partial</b>		
		<b>Speed (ID 5 and ID 6)</b>	<b>Not required</b>
<b>6.4.6 Flash time [fl]</b>	<b>Supported</b>		
<b>6.4.7 Font [fo]</b>	<b>Supported</b>		
<b>6.4.8 Graphic [g]</b>	<b>Supported</b>		
<b>6.4.9 Hexadecimal Character [hc]</b>	<b>Supported</b>		
<b>6.4.10 Justification Line [jl]</b>	<b>Partial</b>		
		<b>[jl5] (full justification)</b>	
<b>6.4.11 Justification Page [jp]</b>	<b>Supported</b>		
<b>6.4.12 Manufacturer specific [ms]</b>	<b>Not supported</b>		
<b>6.4.13 Moving text [mv]</b>	<b>Supported</b>		
<b>6.4.14 New Line [nl]</b>	<b>Supported</b>		
<b>6.4.15 New Page [np]</b>	<b>Supported</b>		
<b>6.4.16 Page time [pt]</b>	<b>Supported</b>		
<b>6.4.17 Spacing character [sc]</b>	<b>Supported</b>		
<b>6.4.18 Text Rectangle</b>	<b>Not supported</b>		



9.7 NTCIP 1201:2005 (V02.32) Global Object (GO) Definitions - Version 02, October 2005

Object group	Supported or Not-Supported	Detail	Comment
<b>2.2 Global configuration</b>	<b>Supported</b>		
		globalModuleTable	1 entry for controller's software 1 entry for controller's hardware
<b>2.3 Global Database management</b>	<b>Not supported</b>		
<b>2.4 Global Time Management</b>	<b>Supported</b>		
		globalDaylightSaving	Supported values: 2..6
		maxTimeBaseScheduleEntries	Max = 255
		maxDayPlan	max = 128
		maxDayPlanEvents	max = 96
		globalLocalTimeDifferential	Supported from v1
<b>2.5 Report Parameter</b>			<b>See NTCIP 1103</b>
<b>2.6 PMPP Object</b>	<b>Supported</b>		
		maxGroupAddresses	Max = 16
<b>2.7 SECURITY</b>			<b>See NTCIP 1103</b>
<b>2.8 Auxiliary I/O</b>	<b>Not supported</b>		



9.8 **NTCIP 2101:2001 (V01.19) Point to Multi-Point Protocol Using RS-232 Subnetwork Profile, November, 2001**

Object group/Section	Supported or Not-Supported	Detail	
<b>Sections 2.1 - 2.4</b>	<b>Partial</b>	Section 2.2.1: T2 counter	Not changeable
		Section 2.2.4: IPI	IPI supported = 0xC1. IPI 0x21 (IP) not supported
		Section 2.2.8: Frame type	Test Command not supported
<b>Sections 2.5.1, HDLC group</b>		<b>Partial</b>	LapBAdmnTransmitN1FrameSize
	LapBAdmnReceiveN1FrameSize		Not supported
	LapBAdmnT1AckTimer		Not supported
	LapBAdmnT2AckDelayTimer		Not supported
<b>Sections 2.5.2, RS232 group</b>	<b>Supported</b>		
<b>Sections 2.5.3, RS232 Async. group</b>	<b>Supported</b>		
<b>Sections 2.5.4, HDLC group addr.</b>	<b>Supported</b>		<b>See NTCIP 1201</b>

9.9 **NTCIP 2103 (V02.07) Point-to-Point Protocol over RS-232 Subnetwork Profile, December, 2008**

- Not required to be supported.

9.10 **NTCIP 2104:2003 (V01.11) Ethernet Subnetwork Profile, September, 2005**

- Not required to be supported.



## **10 References, Support, and Quality Assurances**

It is the intention of this specification for the End-User to receive a reliable TSDMS system that is proven by a record of low maintenance requirements, low power consumption and overall reliable service at actual field installations elsewhere.

It is also the intention of this specification for the End-User to be reasonably assured that the high level of support mentioned throughout this document, shall continue to be available for the equipment throughout the equipment's normal life cycle. This support shall include, but not be limited to, prompt in-house spare and replacement parts availability; in-house field services for repairs, modifications, and paid upgrades; and in-house software support for any custom software supplied by the TSDMS Supplier or TSDMS Manufacturer.

The Bidder shall furnish a letter from the TSDMS Manufacturer or TSDMS Supplier listing the compliance to the provisions of this Section, with a toll free phone number that the End-User may use for telephone technical support during the term of this contract.

The Bidder shall furnish a compliance matrix listing each paragraph of this entire specification with an appropriate statement indicating whether the Bidder will comply with that part of the specification. In cases where the Bidder does not intend to comply with the specification, the Bidder shall indicate clearly how his equipment and/or work differs from the requirements listed herein, and what his intentions are to satisfy the requirements.

The Bidder shall include a certification from the TSDMS Manufacturer that the manufacturer has: a) at least five (5) years' experience in manufacturing, supplying, and supporting fully assembled TSDMS systems, and b) that in-house field service staff, phone support, and sufficient stocked spare parts are available from a USA location.

The Bidder shall furnish a list of five (5) US transportation agencies that have operated and maintained the TSDMS Supplier's systems, for no fewer than three (3) years. This list shall include the names, addresses, and telephone numbers of the agency's responsible contact person.

The Bidder shall identify any projects or circumstances where the Bidder and/or the TSDMS Supplier were required to pay liquidated damages, or defend themselves against liquidated damages in the last five years. Failure to supply this information shall be cause for rejection.



11 Appendix A - Bid Item Configuration Sheet

<u>SPECIFIC SIGN CONFIGURATION</u>	<u>TYPE I</u>	<u>TYPE II</u>	<u>TYPE III</u>	<u>TYPE IV</u>
Number of Signs				
Full Color Display Pitch 20 mm or 33mm				
For Full Matrix Number of Pixels per Sign	____ x ____	____ x ____	____ x ____	____ x ____
Sign dimensions (length x height )	____ x ____	____ x ____	____ x ____	____ x ____
Max Sign weight (Lbs.)				
Optional Angular Mechanism (Yes or No)				
Optional Limited View (No, Right or Left)				
Sign - Maximum Power Consumption				
Cabinet Mounting (Pole or Ground)				
Redundant Power Supplies (Yes or No)				