



**Mobility Series  
LED Blank-Out  
and  
LED Lane Control Signs  
Multi-Color LED  
Sample Procurement Specification**



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SES AMERICA  
SAMPLE PROCUREMENT SPECIFICATION  
**INTELLIGENT TRANSPORTATION SYSTEM**  
**GRID POWERED BLANK-OUT AND LANE CONTROL SIGNS**  
MOBILITY SERIES MULTI-COLOR

## **1 Introduction**

Blank-Out (BOS) or Lane Control (LCS) sign equipment described in this document must comply with the latest versions of the following industry and project standards and requirements where appropriate;

- NEMA TS4 Environmental Standards
- NTCIP 1203 Version 2.39 (when used with a NTCIP controller)
- DOT general specifications and requirements.

This document describes several BOS and LCS configurations, BOS utilizing “String Technology” and LCS utilizing dedicated multiple message LED Display boards.

BOS text character font sizes, symbol designs, and enclosure sizes are based on MUTCD message standards. The BOS must use LED “String technology” where messages and characters are created using unique strings of LEDs embedded directly into the front face of the sign. A BOS can display up to four different messages. Messages can be in the form of text or graphics as in MUTCD symbols.

The LCS must be available in standard 200mm (9”), 300mm (12”), and 457mm (18”) symbol sizes while being available in 4-symbol or 6-symbol configurations.

The exact type of BOS and LCS required for the project are defined in the Appendix A – Bid Item Configuration Sheet.

## **2 BOS and LCS Equipment**

### **2.1 Sign Housing**

- 2.1.1** The BOS 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 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 BOS housing shall provide safe and convenient access to all sign equipment, components, assemblies and other materials located within the sign housing. Internal components shall be removable, transportable and capable of being installed by a single technician.
- 2.1.3** The housing shall protect internal components from rain, ice, dust and corrosion in accordance with NEMA enclosure Type 3R or 4X standards, as described in NEMA Standards Publication 250, Enclosures for Electrical Equipment (1000 Volts Maximum) and specified by the engineer.



- 2.1.4 BOS housings rated NEMA 3R, will have small weep holes for draining any water that may accumulate due to condensation. Weep holes and ventilation 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 a front face utilizing a weather resistant, water tight grommet system in which to install and secure each LED that comprises the message.
- 2.1.6 All BOS assembly component hardware shall be fabricated from, stainless steel. Corrosion protection shall be provided between dissimilar metals.
- 2.1.7 Standard 1 1/2 " NPT Mounting hubs or size appropriate Z-bars shall be provided to mount the BOS per the engineers approval and to meet AASHTO requirements. For Rear Access BOS, the position of any mounting device shall be adjustable as to not interfere with the rear opening doors.

## 2.2 Front Access Characteristics

- 2.2.1 Front Access 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 panel. Doors or panels required to be moved out of their normal closed position for maintenance or repair shall not impair the access of maintenance personnel to the internal components of the DMS.
- 2.2.2 Front Access Door shall be equipped with the following features;
  - Single or multiple vertically hinged rigid door panel which contains the full-height section of the LED display.
  - Door panel must open "left-to-right" or "Right to Left", no lift –face doors are allowed.
  - Each door is equipped with a retaining latch or slide that will hold the door open to a minimum of 90 degrees.
  - Each door is equipped with one or more locking mechanisms 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 or 4X standards as required through the life of the sign. Gasket material will also conform to NEMA TS4 environmental standards.
  - Easy mounting on poles, truss or cantilevers.
  - For NEMA 3R enclosures, each rear panel will be equipped with one or more enclosure vents to allow pressure buildup within the sign to escape.



## **2.3 Rear Access Characteristics**

**2.3.1** Rear Access 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 rear access door panels. Doors or panels required to be moved out of their normal closed position for maintenance or repair shall not impair the access of maintenance personnel to the internal components of the sign.

**2.3.2** Rear Access Door shall be equipped with the following features;

- Full opening of the sign from top to bottom.
- Rear doors will be hinged vertically and open from “Left to Right” or “Right to Left”. no lift –face doors are allowed.
- Each door is equipped with a retaining latch or slide that will hold the door open to a minimum of 90 degrees.
- Each door is equipped with one or more locking mechanisms 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 or 4X standards as required through the life of the sign. Gasket material will also conform to NEMA TS4 environmental standards.
- Easy mounting on poles, truss or cantilevers.
- Mounting of the DMS will be through Z-bars that may run the entire length of the DMS if placed at the bottom and top of the housing. The Z-bar will be positioned in such a way as to not block the opening of the rear access doors.
- For NEMA 3R enclosures, each rear panel will be equipped with one or more enclosure vents to allow pressure buildup within the sign to escape.

## **2.4 BOS Front Face Construction**

**2.4.1** For all types of BOS access, the front face construction shall consist of a door panel(s) punched or drilled in the pattern required for installation of the unique weather resistant, water tight LED and grommet assemblies.

**2.4.2** The front of the sign housing shall be completely surrounded by an area designated to improve contrast thus improving 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 to occur. The sign face shall be designed to minimize bowing and shall not distort in a manner that adversely affects LED message legibility.

## **2.5 LCS Front Face Construction**

**2.5.1** For all types of LCS access, the front face construction shall consist of a door panel equipped with a weather tight, ultraviolet protected, non-diffusing polycarbonate (non-matte finish) window exposing a black aluminum mask onto which the LCS display boards are attached.

**2.5.2** 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 the mask 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.



## **2.6 Exterior Housing Finish (BOS and LCS)**

- 2.6.1** In order to increase contrast ratio and eliminate reflection, the exterior aluminum surfaces must be painted or powder coated matte black to a minimum standard of AAMA 2604 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 signs that exceed 50 lbs., multiple galvanized steel lifting eyebolts shall be attached to the top of the sign housing for moving and installation purposes. All mounting points for eyebolts shall be sealed to prevent water from entering the sign housing. Lifting hardware, as well as the sign housing, shall be designed to prevent damage or undue stress to the sign during shipping or temporary storage prior to installation on the DMS 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.

## **2.9 Visor**

- 2.9.1** A optional visor can be added to the housing. The visor shall be securely attached to the front face of the housing. If a front access door design is to be used, the visor must be attached to the front access door.
- 2.9.2** The visor shall be finished with the same coating as the housing as defined in this document.
- 2.9.3** The visor shall have three surfaces; a top horizontal plane and two vertical sides planes. Visor size and shape will be provided for engineers approval.

## **3 BOS Display Properties**

The BOS message is created by LEDs of various colors properly placed in mounting holes punched or drilled in the front face and sealed by specially designed grommets. LEDs of the same color are connected to each other in small groups (“Strings”) and systematically placed in the front face to create the requested message or messages.

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.

## **4 LCS 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 LCS message or messages is created by LEDs of various colors systematically placed on the display board. When energized, the appropriate message or symbol will illuminate.

### **4.1 Cone of Vision**

- 4.1.1** The cone of vision for the BOS or LCS must be 30 degrees as defined by NEMA TS4. The sign manufacturer must submit a test certificate from an independent laboratory to certify compliance with this requirement.



## **5 Optical Components**

### **5.1 LCS Display Module Design**

- 5.1.1** Each LCS display shall consist of no more than 2 electronic modules that contain all of the LED's, LED drivers, memory, microcontroller and network elements to control the LED's.
- 5.1.2** All like-size modules shall be fully interchangeable within a sign or different types of signs of the same pitch from the same LCS manufacturer.
- 5.1.3** The replacement of a display module shall be possible without the use of any tools, drawings or diagnostic equipment.
- 5.1.4** 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.

### **5.2 LEDs**

All LEDs provided for the manufacture of the BOS or LCS shall conform to the following requirements:

- 5.2.1.1** Red LEDs shall utilize AllnGaP semiconductor technology and shall emit red light that has a peak wavelength of 618-630nm.
- 5.2.1.2** Green LEDs shall utilize InGaN semiconductor technology and shall emit green light that has a peak wavelength of 519-539nm.
- 5.2.1.3** Amber LEDs shall emit a true amber color at a wavelength of 592 nm ( $\pm 5$ nm).
- 5.2.1.4** White LEDs shall have a color temperature of 6500k
- 5.2.1.5** LEDs shall have a nominal viewing angle of 30 degrees ( $15^\circ$  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.
- 5.2.1.6** 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.
- 5.2.1.7** The change of brightness must occur simultaneously on all LEDs used in the sign.





## **6 Main Power Supply and Distribution**

### **6.1 Power Supplies**

- 6.1.1** 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.
- 6.1.2** Power supplies shall be solid state electronic with regulated outputs.
- 6.1.3** **If required, 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 DMS 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 DMS 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.
- 6.1.4** Power supplies shall be short circuit protected by turning the DC power off and shall reset automatically.
- 6.1.5** Power supplies shall be UL listed and RoHS compliant.
- 6.1.6** 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.
- 6.1.7** The regulated DC power supplies shall conform to the following specifications:
  - 6.1.7.1** Operating input voltage range shall be a minimum of 90 to 264 VAC.
  - 6.1.7.2** Operating temperature range shall be a minimum of -30°F to +165°F (-34°C to +74°C).
  - 6.1.7.3** Maximum output power rating shall be maintained over a minimum temperature range of - 30°F to +140°F (-34°C to +60°C).
  - 6.1.7.4** Power supply efficiency shall be a minimum of 80%.
  - 6.1.7.5** Power factor rating shall be a minimum of 0.95.
  - 6.1.7.6** Automatic output shut down and restart shall occur if one of the following faults occurs; over temperature, over-voltage, short circuit, or over-current.

### **6.2 Surge Protection**

- 6.2.1** DMS equipment shall be protected by a double-pole, thermal-magnetic breaker.

### **6.3 BOS and LCS Controller**

Both BOS and LCS can be operated by the end user by means of a dry contact configuration were no controller would be required. The BOS must have a unique controller designed specifically for BOS applications. For applications requiring NTCIP, a NTCIP compliant controller must be used.



### 6.3.1 BOS Controller

The Blank Out Sign Controller provides a means to control the message(s) displayed on a LED string technology Blank Out Sign.

- Controls up to five (5) message element groups of LED strings
- Display controlled by up to four (4) dry-contact inputs
- LED brightness control using built-in luminance sensor or, optionally, up to two (2) off board luminance sensor(s)
- Operating voltage: 9-24Vdc

### 6.3.2 NTCIP Compliant Controller

If required for NTCIP compliancy, the BOS and LCS must be capable of being controlled by either an internal or external NTCIP compliant controller. An internal controller is defined as a NTCIP controller internally mounted inside the sign housing. An external controller is defined as a controller mounted in a remote cabinet location.

### 6.3.3 For an internal controller, the following minimum requirements must be met;

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.

The front panel shall provide the following:

- Two (2) Ethernet 10/100 full-duplex ports,
- One (1) 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,



**6.3.4 For an external controller, the following minimum requirements must be met;**

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.

The front panel shall provide 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,
- Full Color Touch Screen WYSIWYG display of a minimum size 4 5/8 inches width x 3 1/2 inches high

**6.3.5** NTCIP controller shall be designed for message sign control only. The use of a controller originally designed for traffic signals is prohibited.

**6.3.6** Signs shall be controlled by a microprocessor based sign controller capable of operating and monitoring all sign functions.

**6.3.7** The controller must allow the user to operate the sign via web-based interface, NTCIP central software and in the case of the external NTCIP compliant controller front panel touchscreen..

**6.3.8** The external NTCIP compliant controller shall be housed in a durable enclosure and shall be 19 inch EAI rack mountable.

**6.3.9** Controllers shall be capable of driving the LCS sign components via a RS485 network and be fully NTCIP compliant.

**6.3.10** Provide a remote capable web-server interface that will allow remote interface of all front panel user functions. A controller without embedded web-based software will be rejected.

**6.3.11 Controller 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.



### **6.3.12 NTCIP Controller Clock**

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

## **7 Dimming System:**

- 7.1.1** Each BOS or LCS shall be provided with a display intensity control system.
- 7.1.2** For a BOS, the system shall contain a minimum of one ambient light sensor to measure light levels. The sensor shall be positioned monitor the light levels on the front of the BOS.
- 7.1.3** For a LCS, the system shall contain a minimum of two ambient light sensors to measure light levels. The sensors shall be positioned so that one sensor shall monitor the light levels on the front of the sign, a second sensor shall monitor the light striking the back of the sign.
- 7.1.4** If systems equipped with a NTCIP compliant controller, 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.
- 7.1.5** The intensity levels shall be user configurable.
- 7.1.6** 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.

## **8 Diagnostics and System Failure**

### **8.1 Failure Reports**

- 8.1.1** For systems that are equipped with a NTCIP compliant controller, 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**

- 8.2.1** 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.
- 8.2.2** 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

For systems that are equipped with a NTCIP compliant controller, 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              |                                   |
| <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 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<br>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>       |                             |  |

**9.7 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.<br>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 | Not supported  |
|   |                            | 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>                                |

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

- Not required to be supported.

**9.9 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 DMS 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 DMS Supplier or DMS Manufacturer.

The Bidder shall furnish a letter from the DMS Manufacturer or DMS 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 DMS Manufacturer that the manufacturer has: a) at least five (5) years' experience in manufacturing, supplying, and supporting fully assembled DMS 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 DMS 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 DMS 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**

| <b><u>SPECIFIC SIGN CONFIGURATION</u></b>                                   | <b><u>TYPE I</u></b> | <b><u>TYPE II</u></b> | <b><u>TYPE III</u></b> | <b><u>TYPE IV</u></b> |
|---|----------------------|-----------------------|------------------------|-----------------------|
| <b>Number of Signs</b>  |                      |                       |                        |                       |
| <b>BOS or LCS</b>   |                      |                       |                        |                       |
| <b>Number of Messages per Sign</b>  |                      |                       |                        |                       |
| <b>MUTCD Sign Reference #</b>   |                      |                       |                        |                       |
| <b>TEXT of BOS (if more than one sequence, please specify each message)</b> |                      |                       |                        |                       |
| <b>Color and size (specify the color and size of each message)</b>          |                      |                       |                        |                       |
| <b>Control (NTCIP controller or dry contacts)</b>                           |                      |                       |                        |                       |
| <b>Access - Front, Rear, or Both Access (R or F or Both)</b>                |                      |                       |                        |                       |
| <b>Sign dimensions (length x height )</b>                                   |                      |                       |                        |                       |
| <b>Optional visor (Yes or No)</b>   |                      |                       |                        |                       |
| <b>Max Sign weight (Lbs.)</b>   |                      |                       |                        |                       |
| <b>Sign maximum power consumption</b>                                       |                      |                       |                        |                       |
| <b>Electrical Service to Controller (120 or 240 VAC)</b>                    |                      |                       |                        |                       |
| <b>Controller Cabinet Mounting (Pole or Ground)</b>                         |                      |                       |                        |                       |
| <b>Redundant Power Supplies (Yes or No)</b>                                 |                      |                       |                        |                       |