

## **SPECIAL PROVISIONS FOR 750J: DYNAMIC MESSAGE SIGN**

The 2014 Edition of the New Mexico Department of Transportation Standard Specifications for Highway and Bridge Construction shall apply in addition to the following:

### **750J.1 DESCRIPTION**

This specification shall govern the furnishing and installation of mainline walk-in, mainline front access, arterial front access and trailblazer front access Light Emitting Diode (LED) Dynamic Message Signs (DMS). DMSs shall allow for complete adjustment of character size, font width and height, inter-character spacing and support large graphics, in designated field locations and associated equipment cabinets as shown in the plans and as explained in this specification.

For mainline walk-in DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 18 characters / line, with a 3 line display of minimum 18-in characters with a minimum pixel layout of 27 pixel high x 108 pixels wide matrix.

For mainline front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 3 line display of minimum 18-in characters with a minimum pixel layout of 27 pixel high x 90 pixel wide matrix using a 2.6-inch pitch.

For arterial front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 3 line display of minimum 12-in characters, with a minimum pixel layout of 27 pixel high by 96 pixel wide using a 2.6-inch Pitch.

For trailblazer front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 2 line display of minimum 12-in characters, with a minimum pixel layout of 18 pixel high by 72 pixel wide using a 1.75-inch Pitch.

All types of signs shall be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line.

### **750J.1.2 NATIONAL TRANSPORTATION COMMUNICATIONS FOR ITS PROTOCOL (NTCIP).**

All communications between hardware and software devices shall be conformant with the standards and compliant with this project. That acceptance must be obtained at least 30 days prior to deployment of the equipment described herein. NTCIP communications compliance overrides other communications protocols described within this specification.

### **750J.2 MATERIALS**

#### **750J.2.1 General**

All materials furnished, assembled, fabricated or installed under this item shall be new, corrosion resistant and in strict accordance with the details shown in the plans and as explained in this specification.

The company that designs and manufactures the LED DMS shall be currently ISO 9001:2008 certified or has a quality system in place that meets the ISO 9001:2008 standards as of the bid date for this project.

### **750J.2.2 EXPERIENCE REQUIREMENTS**

The company that designs and manufactures the LED DMS shall provide relevant experience of the products supplied in the past. In order to ensure that the experience of the company is relevant to the specified highway application, only the following will be considered qualifying experience: State Highway or Interstate Highway, walk-in, permanently mounted, overhead, LED dynamic message sign.

As of the bid date for this project, the LED DMS Manufacturer shall have the following, all under the current corporate name.

1. Five (5) years' experience in the design and manufacture of dynamic message signs designed for State Highway or Interstate Highway use. The signs shall be permanently mounted, overhead, walk-in variable message signs with a central control systems installed in freeway service.
2. References from not less than three (3) Departments of Transportation for a period of no less than five (5) years that have successfully installed and operated by the owner, no less than five (5) LED DMS signs.
3. NTCIP-compliant LED DMS that successfully passed NTCIP test administered by (1)one, industry-accepted, independent company as part of a contract with a State Department of Transportation identified in 2 above.

The manufacturer of the LED DMS Signs and Systems shall submit documentary evidence and complete reference data for the above requirements. Reference data shall include the name and address of the organization, and the name and telephone number of an individual from the organization who can be contacted to verify the above requirements and all the details required to support the above requirements. This information shall be provided prior to documentation submittal. Failure to furnish the above references or meet the above requirements will be sufficient reason for rejection of the manufacturer's equipment.

The Department reserves the right to contact additional references. Any poor or unsatisfactory reference, as determined by the Department in its sole and absolute discretion, will cause the LED DMS manufacturer to be rejected.

### **750J.3 MAINLINE WALK-IN DMSs**

For mainline walk-in DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 18 characters / line, with a 3 line display of minimum 18-in characters with a minimum pixel layout of 27 pixel high x 108 pixels wide matrix.

They shall be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line.

#### **750J.3.1 MAINLINE DMS WALK-IN SIGN HOUSING**

The equipment shall include a walk-in sign housing. The walk-in sign housing shall be designed to have an access door on one or the other end (not at the same time) or optionally both ends that is accessible from a suitable landing the decision for door location or quantity shall be based on the plan drawings. The housing will contain tie-off points to allow for safe access to and egress from the housing via a bucket truck.

The housing shall be weather tight, and compliant to the NEMA 3R Standard. The sign shall be designed for a minimum life of 30 years. The sign housing shall be capable of withstanding a wind loading of 140 mph. plus a 30% gust without permanent deformation or other damages. The performance of the sign shall not be impaired due to continuous vibration caused by wind, traffic or other factors. This includes the visibility and legibility of the display.

With the exception of the exterior powder coated or approved equivalent fascia material, all exterior seams shall be continuously welded by an inert gas process. This welding shall be in accordance with the American Welding Society (AWS) Standards, ANSI/AWS D1.2/D1.2M-03. The LED DMS manufacturer's welders and welding procedures shall be certified by an ANSI/AWS Certified Welding Inspector to the 2003 ANSI/AWS D1.2/D1.2M-03 Structural Welding Code for Aluminum. Proof of this certification shall be provided with the submittals.

The exterior sign housing skin shall be constructed of aluminum alloy 5052-H32 which shall not be less than 1/8" thick. Internal structural members shall be made of aluminum alloy 6061-T6. External structural members, including the adjustable mounting brackets, shall be made of aluminum alloy 6061-T6.

All parts shall be made of corrosion resistant materials, such as plastic, stainless steel or aluminum. No self-tapping screws shall be used. The exterior front face surfaces shall be exterior grade powder coated. The finish shall be matte black. The rest of the sign housing shall remain in its natural aluminum mill finish.

The glazing shall be a minimum of 1/8", 80% UV opaque polycarbonate, or equivalent. The glazing shall be protected by an exterior grade powder coated aluminum mask, with apertures punched directly in front of each pixel.

The border and the external fascia perimeter panels shall be a minimum of 12 inches wide.

The glazing, aluminum mask and the external fascia perimeter panels shall be easily replaceable from within the sign housing and not requiring the use of equipment from the outside.

The bottom panel of the housing shall have a minimum of four drain holes, with snap-in, drain filter plug inserts.

The ventilation system shall be POSITIVE pressure air. The system shall be designed to adequately cool the pixels along with the front and rear of the display module and all other internal components. The ventilation system shall have the following properties:

1. Maintain positive pressures. Exhaust fans are not acceptable.
2. Have a minimum of two intake fans. Fans shall provide a minimum of one sign housing volume change per minute at the pressure drop developed throughout the entire ventilation system with all fans operating. In addition, the complete ventilation system shall provide a minimum of one sign housing volume changes per minute at the same pressure drop.

3. These filters shall be easily removable from within the sign housing without the use of tools. Adequate airflow shall be automatically tested once a day and tested on command from the central controller or Dynamic Message Sign Maintenance Controller (DMSMC). Inadequate airflow will cause an error message to be sent to the central controller or DMSMC when the sign controller is polled by the central controller or DMSMC.
4. Entire face must be ventilated by an efficient forced air system. The air shall be directed to provide equal distribution of air to the bottom of each display module along each message line. Air shall be ducted directly from the fans to the ducts at the bottom of each message line. The duct at the bottom of each message line shall evenly distribute air into the cavity between each display module and the lens panel. The air shall then be exhausted out of the top of each display module. Air shall also be directed uniformly to the back of the display modules. All duct work that impedes access to any sign components shall be easily removable, without tools, for servicing of these components.
5. A minimum of one (1) internal temperature sensors shall be provided.
6. A humidity sensor shall be provided in the sign (a humidistat is not acceptable).
7. The sign shall be designed to prevent condensation or fog from forming on the face of the sign. The sign shall have a system in place to heat the air between the LED and lens to remove the condensation or fog. Other methods of preventing condensation or fog may be pre-approved by the NMDOT engineer.

The walk-in shall have the ability to have an access door installed at either or both ends of the sign housing and shall be specified in the plan documents. The sign housing shall have tie-off points in the immediate vicinity of the access door to accommodate safe entry into and exit from the sign housing by personnel. A three-point lockable aluminum access door shall provide easy access for a single maintenance person. The door will be fitted with a handle operated locking mechanism, closed cell neoprene gasket and a stainless steel hinge. The door assembly shall also include a device to hold the door open at 90 degrees. The doorway will be equipped with a safety gate for locking in place when the door is held open. When engaged and locked into place, the safety gate shall be designed to prevent falls through the doorway. There shall be notification to the Central Controller whenever the door is accessed. Notification shall be logged and passed to the Central Controller at the next poll. The locking mechanism shall be a three-point dead bolt, center-case lock. There shall be a handle on both sides of the door. The lock mechanism and handles shall be corrosion resistant. The door shall be provided with a door alarm that is controlled by the sign controller.

The sign housing shall have a continuous, interior walkway (minimum 18" width) extending the full length of the sign. The internal structural members shall be extruded aluminum and shall accommodate both the display module mountings while allowing air distribution. The display modules shall be removed and replaced without disturbing adjacent modules. The interior walk-way should be clear of any extrusions, overhead supports, etc; that can harm the employees working inside the sign.

A fold down aluminum shelf shall be provided near the sign controller for the DMSMC.

Heaters shall be provided to warm the interior of the walk-in housing to 20°F above ambient up to 70°F. These heaters shall be controlled in the sign and remotely from the DMSMC and central computers.

The housing shall be designed to accommodate mounting on the rear vertical plane.

The system power shall be protected from transient voltage by surge suppression devices. Also, communication lines shall be protected from transient voltage by surge suppression devices as required in the Sign Controller Communication Interface Section of this specification. The Controller shall report the error condition to central on the next poll.

### **750J.3.2 MAINLINE WALK-IN DMS SIGN CONTROLLER.**

The sign controller shall be mounted in the sign housing. A separate optional outside pole-mounted (on sign structure) weather tight local control box meeting NEMA 3R standards shall be provided and located on the sign structure accessible at ground level. It will provide peripheral communications to the controller inside the sign housing. All sign controller cabinets will be UL50 Certified.

The following shall be located inside the sign housing:

1. Ethernet plug for DMS sign maintenance and DMS operation
2. RS-232 plug-in connection for the Dynamic Message Sign Maintenance Controller.
3. Optional Uninterruptible power supply to maintain the controller during power out conditions. It shall be a separate off-the-shelf device.
4. Fold-down aluminum shelf for the DMSMC.

The optional local control box shall be mounted as indicated in the plans. This typically shall be on the sign support structure pole away from traffic or protected by guardrail. The control box shall contain the following features:

1. Power-on indicator.
2. If DMS Roadside controller is provided
  - a. A single DMS Roadside controller shall be capable of controlling 1 or more signs using a single IP address.
  - b. Local/Remote switch
  - c. Ethernet connection for local control
  - d. Ethernet connection for central control
  - e. Ethernet connection for 1 or more signs
  - f. AC power indicator
  - g. DC power indicator
  - h. RS-232 Local only connection
3. 2-120 VAC GFI outlets.
4. Pullout laptop shelf.
5. Modems or Fiber Optic Ethernet Switches – Contact ITS-IT Services for specifications
6. NEMA 3R rated with neoprene gasketing on doors.
7. Aluminum construction with natural finish.
8. Heavy duty 3-point pad lockable hardware on all doors.
9. Continuous door length stainless steel hinges (or 1/8" inch aluminum with stainless steel pins)
10. Doors open to 90° with retainer for open position.
11. Ethernet communication from the local control box to the sign.

12. Breaker Assembly for Power In to accommodate two (2) 50 amp legs or manufacturer's load requirements for DMS as well as dedicated circuit internal to the controller cabinet for power supply to electrical receptacle at 20 amps each.

At a minimum the sign controller will meet the minimum requirements of the NEMA TS4-2005 standard.

### **750J.3.3 MAINLINE WALK-IN DMS Electronics**

All electronic components, except printed circuit boards, shall be commercially available, easily accessible, replaceable and individually removable using conventional electronics repair methods.

All workmanship shall comply with ANSI/IPC-A-610B Class 2 titled "Acceptability of Electronic Assemblies," ANSI/IPC-7711 titled "Rework of Electronic Assemblies" and ANSI/IPC-7721 titled "Rework and Modification of Printed Boards and Electronic Assemblies." All Printed Circuit Boards (PCBs) shall be completely conformal coated with a silicone resin or equivalent conformal coat to the manufacturers recommended thickness. The material shall comply with the United States Department of Defense requirements as detailed in MIL-I-46058 C Type SR military standard. The PCB of the LED motherboards and any components in sockets shall comply with the coating requirements, except for the pixels on the front of the PCB.

All discrete components, such as resistors, capacitors, diodes, transistors, and integrated circuits shall be individually replaceable. Components shall be arranged so they are easily accessible for testing and replacement.

All circuit designs shall be high quality electronic components and shall provide a meantime before failure of at least 4 years.

The DMS shall be designed in accordance with the NEMA TS4-2005 Section 2 Environmental Requirements.

Provisions shall be made to prevent face fogging and condensation. The sign controller shall read the internal temperature sensors, and the humidity sensor. The sign controller shall use these readings in an algorithm that turns on the heaters to reduce both frost on the face of the sign and condensation on the display modules and other electronic circuitry.

The sign housing shall be furnished with a minimum of (3) three, minimum of 30-inch long 24vdc led light bars and one GFI duplex outlets that protects 2 other duplex outlets. The lighting shall be evenly spaced above the walkway. The duplex outlets shall be evenly spaced on the back wall at a maximum height of 30 inches above the walkway. A 12-hour timer for the lights shall be located near the door. The light timer shall not incorporate a hold feature. Other lighting may be provided but must be approved by the NMDOT engineer prior to procurement.

LED Module LEDs shall meet the following minimum requirements:

1. 30 degree viewing angle
2. Amber in color
3. Operating temperature range of -40°C to +100°C
4. Moisture resistant epoxy with uv-a and uv-b inhibitors

5. LEDs must be mounted in such a way to ensure that they remain in a fixed position.
6. Each LED within a pixel shall contain zener diodes to allow each LED to operate independent of other LEDs within that same pixel string.
7. The failure of an LED in one string within a pixel shall not affect the operation of any other string or pixel.

The color of the pixels shall be amber. The DMS shall have brightness as defined by NEMA TS4-2005 of 7440Cd/m<sup>2</sup>

The brightness and color of each pixel shall be uniform over the entire face of the sign within the 15-degree cone of vision from 1,100 feet to 200 feet in all lighting conditions.

Certification shall be provided, with the submittals, from the LED manufacturer that demonstrates that the LEDs were tested and binned in accordance with the CIE Test Method A.

Each pixel shall contain two strings of LEDs. The pixel strings shall be powered from a regulated DC power source and the LED current shall not exceed the LED manufacturer's maximum drive current.

All LEDs shall be mounted so that their mechanical axis is normal +/- 1.00 degree to the face of the sign to ensure brightness uniformity over the face of the sign. The sign manufacturer shall propose a method, acceptable to the engineer, to test the LEDs in the display modules to ensure they meet the criteria. The LED modules for the mainline walk-in and the mainline front access shall be identical and interchangeable as spare parts.

Manufacturer shall ensure that each pixel shall protect LEDs in the following manner:

1. Hold the LEDs perpendicular to the display modules within 0.5 degree.
2. Protect the LEDs from damage when the display module is laid on the front surface (the side that the LED lamps are located).
3. Be easily removable from the display module PCB without any tools.
4. Not put any stress on the LEDs due to differentials of expansion and contraction between the device and the LEDs over the herein specified temperature range.
5. Not become loose or fall off during handling or due to vibrations.
6. Not block airflow over the leads of the LEDs.
7. Securely hold each LED while allowing a gap between the device and a minimum of 95% of the body of each LED for airflow.
8. Not block the light output of the LEDs at the required viewing angle.

A minimum of three (3) photocells shall be installed on the sign. These devices shall permit automatic light intensity measurement of light conditions at each sign location. These photocells shall be mounted in a manner to measure front, rear and ambient light conditions.

Pixel brightness shall be controlled by pulse width modulation of the DC current or equivalent control. Brightness shall be manually settable from the controller and remotely from the central computer in 1% increments. Brightness control shall be able to be returned to automatic from the sign controller and the central computer

Provisions shall be made to prevent perceivable brightening of the sign due to headlights shining upon the photo sensors at night.

The photo circuit readings shall be correlated with a brightness table in the sign controller. The brightness table shall have a minimum of 15 brightness levels. Automatic adjustment of the LED driving waveform duty cycle shall occur in small enough increments so that brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. The brightness table in each individual sign controller shall be adjustable from the central controller and can be customized according to the requirements of the installation site. Each sign shall have its own, independent brightness table. Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in one percent increments from one to 99 percent.

The power supplies shall be redundant and power sharing by use of a diode or configured such that one supply may completely fail and the sign will still be supplied with enough power to run 40% of all pixels at 100% duty cycle at 65 degrees C. Functioning supplies must current-share to within 10%. The combined effect of line (97 to 135 VAC) and load (10% to 100%) on the power supplies shall not exceed 1.0%. The efficiency of the power supplies shall be 85% or greater at 120 VAC from 50% to 100% of maximum load. The power supplies shall have a power factor of 0.95 or greater at 120 VAC from 50% to 100% of maximum load. All cables shall be securely clamped/tied in the sign housing. No adhesive attachments will be allowed. A redundant power supply must be furnished for each sign. The power supplies used in the walk-in, mainline front access and arterial front access DMS housings shall be identical and interchangeable as spare parts.

#### **750J.4 MAINLINE FRONT ACCESS DMS**

For mainline front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 3 line display of minimum 18-in characters with a minimum pixel layout of 27 pixel high x 90 pixel wide matrix.

##### **750J.4.1 MAINLINE FRONT ACCESS DMS HOUSING & DISPLAY**

Mainline front access DMSs shall be of a modular construction. The modules shall be constructed of a minimum of .063 thick 5052-H32 aluminum skin with a mill finish. The front display area shall be protected by a door that is .063 thick 5052-H32 Aluminum skin with a matte black exterior grade powder coated finish and integral polycarbonate mask. The door shall be the same modular size as the case. The door shall be held in place by a minimum of 1 automatically engaging support. The External structure of the DMS shall be made from formed 5052-H32 aluminum channels and have an integral Z-Bar (6061-T6 aluminum) along the top and bottom of the structure for mounting.

The door shall have openings sized to not block the LED light output and shall have a minimum of .125-inch nominal thickness polycarbonate SG-308 material protecting the LEDs.

Each Modular case shall have 1 internal mixing fan and 1 ventilation fan housing that provides positive pressure ventilation. The internal mixing fan shall have a trip point lower than the ventilation housing fan to allow for even temperature distribution within the enclosure and to prevent unnecessary external ambient ventilation air from entering the DMS housing. The exhaust shall be through the front face of the DMS. The ventilation housing shall use a reusable filter media and the housing shall have the option of filter maintenance from either the rear of the housing or from inside the modular cases.

The DMS shall be structurally designed in accordance with the AASHTO standard Specifications for Structural Supports for Highway Signs, Luminaries, and traffic signals.

The DMS shall have an external light sensor globe that is monitors the front/rear/top ambient lighting conditions. The light sensor shall meet the requirements of the NEMA TS4-2005 standard section 8.8

The DMS shall be designed to the NEMA TS4-2005 section 2 Environmental Requirements.

The DMS doors shall be designed to be opened by a single technician. The LED modules will be attached to the door and easily serviced by a single technician.

DMS structure shall be fabricated, welded and inspected in accordance with ANSI/AWS dl.2-97 *Structural Welding Code Aluminum* (1997). Compliance with this standard includes, but not be limited to, welding performed according to documented in-house welding procedures, and all welders are certified to AWS D1.2-97 for all weld types required.

The DMS housing shall be designed and constructed to withstand a minimum sustained wind load of 140 mph as specified in AASHTO edition 4 2004. The housing shall be designed in compliance with all applicable sections of *AASHTO Standard Specifications of Structural Supports for Highway Signs, Luminaries and Traffic Signals. Fourth Edition 2004*

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 1997, Enclosures for Electrical Equipment (1000 Volts Maximum)*.

Housing and modules shall be constructed so that all maintenance is performed from the front of the sign.

Housing shall be constructed to have a neat, professional appearance. All cables are securely clamped/tied in the sign housing. Adhesive cable tie pads shall not be utilized.

Bottom side shall contain small weep holes for draining any water that accumulates due to condensation. Weep holes and ventilation/exhaust hoods shall be screened to prevent the entrance of insects and small animals.

Housing shall have an interior non-corrosive metal cage support frames to mount the display elements. Cage support frame shall withstand and minimize vibration when the sign is mounted with any number of display elements.

#### Housing Frame

DMS shall be constructed using a structural frame consisting of aluminum extrusions made from alloy number 6061-T6 and formed aluminum 5052-H32 members. All sides, except front shall be covered with 0.063-inch thick aluminum sheets made from alloy number 5052-H32.

#### Mounting Brackets

The housing shall have 2 lifting eyebolts to be used when placing the housing on the sign structure. Each eye shall have a minimum inside diameter of 1.00 inch. Each eye, shall have sufficient structural strength to allow the sign be lifted or moved without structural damage or permanent deformation to the sign.

All structural hardware and mounting brackets hardware (nuts, bolts, washers, and direct tension indicators) shall be stainless steel or galvanized high-strength steel and are appropriately sized for the application. Approved mounting attachments will be supplied with sign.

#### Display Door Construction

The DMS sign face shall consist of a multiple front access doors, which provides access to all of the DMS components. The display modules shall be mounted to the back side of the doors. The door shall hold the polycarbonate and provide for a sealed watertight front face.

The sign face display door shall fabricated from a minimum of 0.063-inch aluminum sheeting and panel interiors contain a nominal 0.125-inch SG-308 polycarbonate sheeting. A single support arm shall be used to hold door open when servicing and the door shall remain in the open position with no support prior to the support being applied. .

#### Housing Exterior Finish

The DMS exterior, with the exception of the front face, shall be mill-finish aluminum. The front face shall finished with exterior grade matte black powder coat.

#### 750J.4 .2 MAINLINE FRONT-ACCESS DMS SIGN CONTROLLER.

At a minimum the sign controller will contain the following options:

1. IP Address
2. Wireless Network Option
3. Local RS-232 connection to a laptop
4. RS-232 port
5. Central RS-232 connection Dual, Simultaneous communication in the field with remote switching capabilities
6. Local Ethernet connection to a Laptop *\_ in the optional Pole Cabinet*
7. Central Ethernet connection to a CDMA (EVDO) modem (Ethernet), fiber modem (Ethernet), or any other Ethernet device – *in the optional Pole Cabinet*
8. WI-FI connection with a wireless option to any WI-FI enabled device

In addition, the controller must support NTCIP standards (as described in Section \_\_\_ of this specification) and also be able to accommodate at least seven (7) digital inputs, two (2) analog inputs, three (3) digital outputs and three (2) RS-232 DB9 serial ports.

### 750J.4.3 ELECTRONICS

The DMS electronics shall be capable of withstanding harsh vibration and environmental conditions as set forth by NEMA TS 4-2005 section 2 Environmental Requirements. Connectors shall use indexing features that prohibit mismatching of connectors, electrical contacts or locking features to engage.

LED Module LEDs shall meet the following minimum requirements:

1. 30 degree viewing angle
2. Amber in color
3. Operating temperature range of -40°C to +100°C
4. Moisture resistant epoxy with uv-a and uv-b inhibitors
5. LEDs must be mounted in such a way to ensure that they remain in a fixed position.
6. Each LED within a pixel shall contain zener diodes to allow each LED to operate independent of other LEDs within that same pixel string.
7. The failure of an LED in one string within a pixel shall not affect the operation of any other string or pixel.

The color of the pixels shall be amber. The DMS shall have a brightness as defined by NEMA TS4-2005 of 7440Cd/m<sup>2</sup>.

The brightness and color of each pixel shall be uniform over the entire face of the sign within the 15-degree cone of vision from 1,100 feet to 200 feet in all lighting conditions.

Certification shall be provided, with the submittals, from the LED manufacturer that demonstrates that the LEDs were tested and binned in accordance with the CIE Test Method A.

Each pixel shall contain two strings of LEDs. The pixel strings shall be powered from a regulated DC power source and the LED current shall not exceed the LED manufacturer's maximum drive current.

All LEDs shall be mounted so that their mechanical axis is normal +/- 1.00 degree to the face of the sign to ensure brightness uniformity over the face of the sign. The sign manufacturer shall propose a method, acceptable to the engineer, to test the LEDs in the display modules to ensure they meet the criteria. The LED modules for the mainline walk-in and the mainline front access shall be identical and interchangeable as spare parts.

Manufacturer shall ensure that each pixel shall protect LEDs in the following manner:

1. Hold the LEDs perpendicular to the display modules within 0.5 degree.
2. Protect the LEDs from damage when the display module is laid on the front surface (the side that the LED lamps are located).
3. Be easily removable from the display module PCB without any tools.

4. Not put any stress on the LEDs due to differentials of expansion and contraction between the device and the LEDs over the herein specified temperature range.
5. Not become loose or fall off during handling or due to vibrations.
6. Not block airflow over the leads of the LEDs.
7. Securely hold each LED while allowing a gap between the device and a minimum of 95% of the body of each LED for airflow.
8. Not block the light output of the LEDs at the required viewing angle.

A minimum of three (3) photocells shall be installed on the sign. These devices shall permit automatic light intensity measurement of light conditions at each sign location. These photocells shall be mounted in a manner to measure front, rear and ambient light conditions.

Pixel brightness shall be controlled by pulse width modulation of the DC current or equivalent control. Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in 1% increments. Brightness control shall be able to be returned to automatic from the sign controller front panel and the central computer

Provisions shall be made to prevent perceivable brightening of the sign due to headlights shining upon the photo sensors at night.

Pixel brightness shall be controlled by pulse width modulation of the DC current or equivalent control. Brightness shall be manually settable from the controller and remotely from the central computer in 1% increments. Brightness control shall be able to be returned to automatic from the sign controller and the central computer

Provisions shall be made to prevent perceivable brightening of the sign due to headlights shining upon the photo sensors at night.

The photo circuit readings shall be correlated with a brightness table in the sign controller. The brightness table shall have a minimum of 15 brightness levels. Automatic adjustment of the LED driving waveform duty cycle shall occur in small enough increments so that brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. The brightness table in each individual sign controller shall be adjustable from the central controller and can be customized according to the requirements of the installation site. Each sign shall have its own, independent brightness table. Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in one percent increments from one to 99 percent.

The power supplies shall be redundant and power sharing by use of a diode or configured such that one supply may completely fail and the sign will still be supplied with enough power to run 40% of all pixels at 100% duty cycle at 65 degrees C. Functioning supplies must current-share to within 10%. The combined effect of line (97 to 135 VAC) and load (10% to 100%) on the power supplies shall not exceed 1.0%. The efficiency of the power supplies shall be 85% or greater at 120 VAC from 50% to 100% of maximum load. The power supplies shall have a power factor of 0.95 or greater at 120 VAC from 50% to 100% of maximum load. All cables shall be securely clamped/tied in the sign housing. No adhesive attachments will be allowed. A redundant power supply must be furnished for each sign. The power supplies used in the walk-in and mainline front access and arterial front access DMS housings shall be identical and interchangeable.

## 750J.5 ARTERIAL FRONT ACCESS AND TRAIL BLAZER FRONT ACCESS

For arterial front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 3 line display of minimum 12-in characters, with a minimum pixel layout of 27 pixel high by 96 pixel wide.

For trailblazer front access DMSs, the display shall be a full matrix configuration, the DMS shall be capable of displaying 15 characters / line, with a 2 line display of minimum 12-in characters, with a minimum pixel layout of 18 pixel high by 72 pixel wide.

The signs shall be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line.

### 750J.5 .1 ARTERIAL FRONT ACCESS AND TRAIL BLAZER FRONT ACCESS DMS SIGN HOUSING

Arterial front access DMSs shall be of a modular construction. The modules shall be constructed of a minimum of .063 thick 5052-H32 aluminum skin with a mill finish. The front display area shall be protected by a door that is .063 thick 5052-H32 Aluminum skin with a matte black exterior grade powder coated finish and integral polycarbonate mask. The door shall be the same modular size as the case. The door shall be held in place by a minimum of 1 manual engaged support. The External structure of the DMS shall be made from formed 5052-H32 aluminum channels and have an integral Z-Bar (6061-T6 aluminum) along the top and bottom of the structure for mounting.

The door shall have openings sized to not block the LED light output and shall have a minimum of .125-inch nominal thickness polycarbonate SG-308 material protecting the LEDs.

Each Modular case shall have 1 internal mixing fan and 1 ventilation fan housing that provides positive pressure ventilation. The internal mixing fan shall have a trip point lower than the ventilation housing fan to allow for even temperature distribution within the enclosure and to prevent unnecessary external ambient ventilation air from entering the DMS housing. The exhaust shall be through the front face of the DMS. The ventilation housing shall use a reusable filter media and the housing shall have the option of filter maintenance from either the rear of the housing or from inside the modular cases.

The DMS shall be structurally designed in accordance with the AASHTO standard Specifications for Structural Supports for Highway Signs, Luminaries, and traffic signals.

The DMS shall have an external light sensor globe that is monitors the front/rear/top ambient lighting conditions. The light sensor shall meet the requirements of the NEMA TS4-2005 standard section 8.8

The DMS shall be designed to the NEMA TS4-2005 section 2 Environmental Requirements.

The DMS doors shall be designed to be opened by a single technician. The LED modules will be attached to the door and easily serviced by a single technician.

DMS structure shall be fabricated, welded and inspected in accordance with ANSI/AWS d1.2-97 *Structural Welding Code Aluminum* (1997). Compliance with this standard includes, but not be limited to, welding performed according to documented in-house welding procedures, and all welders are certified to AWS D1.2-97 for all weld types required.

The DMS housing shall be designed and constructed to withstand a minimum sustained wind load of 140 mph as specified in AASHTO edition 4 2004. The housing shall be designed in compliance with all applicable sections of *AASHTO Standard Specifications of Structural Supports for Highway Signs, Luminaries and Traffic Signals. Fourth Edition 2004*

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 1997, Enclosures for Electrical Equipment (1000 Volts Maximum)*.

Housing and modules shall be constructed so that all maintenance is performed from the front of the sign.

Housing shall be constructed to have a neat, professional appearance. All cables are securely clamped/tied in the sign housing. Adhesive cable tie pads shall not be utilized.

Bottom side shall contain small weep holes for draining any water that accumulates due to condensation. Weep holes and ventilation/exhaust hoods shall be screened to prevent the entrance of insects and small animals.

Housing shall have an interior non-corrosive metal cage support frames to mount the display elements. Cage support frame shall withstand and minimize vibration when the sign is mounted with any number of display elements.

#### Housing Frame

DMS shall be constructed using a structural frame consisting of aluminum extrusions made from alloy number 6061-T6 and formed aluminum 5052-H32 members. All sides, except front shall be covered with 0.063-inch thick aluminum sheets made from alloy number 5052-H32.

#### Mounting Brackets

The housing shall have 2 lifting eyebolts to be used when placing the housing on the sign structure. Each eye shall have a minimum inside diameter of 1.00 inch. Each eye, shall have sufficient structural strength to allow the sign be lifted or moved without structural damage or permanent deformation to the sign.

All structural hardware and mounting brackets hardware (nuts, bolts, washers, and direct tension indicators) shall be stainless steel or galvanized high-strength steel and are appropriately sized for the application. Approved mounting attachments will be supplied with sign.

#### Display Door Construction

The DMS sign face shall consist of a multiple front access doors, which provides access to all of the DMS components. The display modules shall be mounted to the back side of the doors. The door shall hold the polycarbonate and provide for a sealed watertight front face.

The sign face display door shall be fabricated from a minimum of 0.063-inch aluminum sheeting and panel interiors contain a nominal 0.125-inch SG-308 polycarbonate sheeting. A single support arm shall be used to hold door open when servicing and the door shall remain in the open position with no support prior to the support being applied. .

#### Housing Exterior Finish

The DMS exterior, with the exception of the front face, shall be mill-finish aluminum. The front face shall be finished with exterior grade matte black powder coat.

#### 750J.5.2 ARTERIAL FRONT ACCESS AND TRAIL BLAZER FRONT ACCESS DMS SIGN CONTROLLER

The sign controller shall be mounted in the sign housing. A separate optional outside pole-mounted (on sign structure) weather tight local control box meeting NEMA 3R standards shall be provided and located on the sign structure accessible at ground level. It will provide peripheral communications to the controller inside the sign housing. All sign controller cabinets will be UL50 Certified.

The following shall be located inside the sign housing:

1. Ethernet plug for DMS sign maintenance and DMS operation
2. RS-232 plug-in connection for the Dynamic Message Sign Maintenance Controller.
3. Optional Uninterruptible power supply to maintain the controller during power out conditions. It shall be a separate off-the-shelf device.
4. Fold-down aluminum shelf for the DMSMC.

The optional local control box shall be mounted as indicated in the plans. This typically shall be on the sign support structure pole away from traffic or protected by guardrail. The control box shall contain the following features:

13. Power-on indicator.
14. If DMS Roadside controller is provided
  - a. A single DMS Roadside controller shall be capable of controlling 1 or more signs using a single IP address.
  - b. Local/Remote switch
  - c. Ethernet connection for local control
  - d. Ethernet connection for central control
  - e. Ethernet connection for 1 or more signs
  - f. AC power indicator
  - g. DC power indicator
  - h. RS-232 Local only connection
15. 2-120 VAC GFI outlets.
16. Pullout laptop shelf.
17. Modems or Fiber Optic Ethernet Switches – Contact ITS-IT Services for specifications
18. NEMA 3R rated with neoprene gasketing on doors.
19. Aluminum construction with natural finish.

20. Heavy duty 3-point pad lockable hardware on all doors.
21. Continuous door length stainless steel hinges (or 1/8" inch aluminum with stainless steel pins)
22. Doors open to 90° with retainer for open position.
23. Ethernet communication from the local control box to the sign.
24. Breaker Assembly for Power In to accommodate two (2) 50 amp legs or manufacturer's load requirements for DMS as well as dedicated circuit internal to the controller cabinet for power supply to electrical receptacle at 20 amps each.

At a minimum the sign controller will meet the minimum requirements of the NEMA TS4-2005 standard.

### **750J.5.3 ARTERIAL FRONT ACCESS AND TRAIL BLAZER FRONT ACCESS**

#### **DMS ELECTRONICS**

All electronic components, except printed circuit boards, shall be commercially available, easily accessible, replaceable and individually removable using conventional electronics repair methods.

All workmanship shall comply with ANSI/IPC-A-610B Class 2 titled "Acceptability of Electronic Assemblies," ANSI/IPC-7711 titled "Rework of Electronic Assemblies" and ANSI/IPC-7721 titled "Rework and Modification of Printed Boards and Electronic Assemblies." All Printed Circuit Boards (PCBs) shall be completely conformal coated with a silicone resin or equivalent conformal coat to the manufacturers recommended thickness. The material shall comply with the United States Department of Defense requirements as detailed in MIL-I-46058 C Type SR military standard. The PCB of the LED motherboards and any components in sockets shall comply with the coating requirements, except for the pixels on the front of the PCB.

All discrete components, such as resistors, capacitors, diodes, transistors, and integrated circuits shall be individually replaceable. Components shall be arranged so they are easily accessible for testing and replacement.

All circuit designs shall be high quality electronic components and shall provide a meantime before failure of at least 4 years.

The DMS shall be designed in accordance with the NEMA TS4-2005 Section 2 Environmental Requirements.

LED Module LEDs shall meet the following minimum requirements:

1. 30 degree viewing angle
2. Amber in color
3. Operating temperature range of -40°C to +100°C
4. Moisture resistant epoxy with uv-a and uv-b inhibitors
5. LEDs must be mounted in such a way to ensure that they remain in a fixed position.
6. Each LED within a pixel shall contain zener diodes to allow each LED to operate independent of other LEDs within that same pixel string.
7. The failure of an LED in one string within a pixel shall not affect the operation of any other string or pixel.

The color of the pixels shall be amber The DMS shall have a brightness as defined by NEMA TS4-2005 of 7440Cd/m<sup>2</sup>

The brightness and color of each pixel shall be uniform over the entire face of the sign within the 15-degree cone of vision from 1,100 feet to 200 feet in all lighting conditions.

Certification shall be provided, with the submittals, from the LED manufacturer that demonstrates that the LEDs were tested and binned in accordance with the CIE Test Method A.

Each pixel shall contain two strings of LEDs. The pixel strings shall be powered from a regulated DC power source and the LED current shall not exceed the LED manufacturer's maximum drive current.

All LEDs shall be mounted so that their mechanical axis is normal +/- 1.00 degree to the face of the sign to ensure brightness uniformity over the face of the sign. The sign manufacturer shall propose a method, acceptable to the engineer, to test the LEDs in the display modules to ensure they meet the criteria. The LED modules for the trailblazer arterial and Arterial front access shall be identical and interchangeable as spare parts.

Manufacturer shall ensure that each pixel shall protect LEDs in the following manner:

1. Hold the LEDs perpendicular to the display modules within 0.5 degree.
2. Prevent the LEDs from being crushed or bent during handling.
3. Be easily removable from the display module PCB without any tools.
4. Not put any stress on the LEDs due to differentials of expansion and contraction between the device and the LEDs over the herein specified temperature range.
5. Not become loose or fall off during handling or due to vibrations.
6. Not block airflow over the leads of the LEDs.
7. Securely hold each LED while allowing a gap between the device and a minimum of 95% of the body of each LED for airflow.
8. Not block the light output of the LEDs at the required viewing angle.

A minimum of three (3) photocells shall be installed on the sign. These devices shall permit automatic light intensity measurement of light conditions at each sign location. These photocells shall be mounted in a manner to measure front, rear and ambient light conditions.

Pixel brightness shall be controlled by pulse width modulation of the DC current or equivalent control. Brightness shall be manually settable from the front panel of the controller and remotely from the central computer in 1% increments. Brightness control shall be able to be returned to automatic from the sign controller front panel and the central computer

Provisions shall be made to prevent perceivable brightening of the sign due to headlights shining upon the photo sensors at night.

The photo circuit readings shall be correlated with a brightness table in the sign controller. The brightness table shall have a minimum of 15 brightness levels. Automatic adjustment of the LED driving waveform duty cycle shall occur in small enough increments so that brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. The brightness table in each individual sign controller shall be adjustable from the central controller and can be customized according to the requirements of the installation site. Each sign shall have its own, independent brightness table. Brightness shall be manually settable from the

front panel of the controller and remotely from the central computer in one percent increments from one to 99 percent.

The power supplies shall be redundant and power sharing by use of a diode or configured such that one supply may completely fail and the sign will still be supplied with enough power to run 40% of all pixels at 100% duty cycle at 65 degrees C. Functioning supplies must current-share to within 10%. The combined effect of line (97 to 135 VAC) and load (10% to 100%) on the power supplies shall not exceed 1.0%. The efficiency of the power supplies shall be 85% or greater at 120 VAC from 50% to 100% of maximum load. The power supplies shall have a power factor of 0.95 or greater at 120 VAC from 50% to 100% of maximum load. All cables shall be securely clamped/tied in the sign housing. No adhesive attachments will be allowed. A redundant power supply must be furnished for each sign. The power supplies used in the walk-in and mainline front access and arterial front access DMS housings shall be identical and interchangeable.

#### **750J.5.4.1 Arterial Front Access and Trailblazer Front Access DMS LED Display modules**

All display modules shall be mechanically, electrically and optically interchangeable within the sign.

The display modules shall be rectangular, and have the same horizontal and vertical pitch. The pixel pitch between modules shall be consistent with the pixel pitch within the modules.

Each LED display module shall consist of a matrix of 6 pixels horizontally by 9 pixels vertically.

Each display module shall be mounted with durable, non-corrosive hardware to the DMS aluminum display rail from the inside. These fasteners shall not require the use of specialized tools during servicing.

All LED display module electrical and signal connections shall be made with quick-disconnect locking type connectors.

The DMS shall function so that if any display module is removed or has failed, it will not detract from the structural integrity of the sign nor affect the performance of any other module of the sign. At initial DMS power-up, a failed display module shall not impact the ability for the controller to communicate properly to the functional display modules.

Display Modules shall be interchanged within a sign without any changes in dipswitch settings. The modules shall be assigned an address as part of the wiring harness.

All display modules shall have conformal coating applied as part of the sub-assembly process.

Each display modules shall consist of a Pixel board and a Drive Card. The Drive Card shall be a separate, removable daughterboard, which controls each display module. The daughterboard shall attach directly to the back of each LED display module. Each display modules shall have a dedicated daughterboard to minimize the number of connectors and the use of ribbon cables.

#### **750J.5.4.2 ARTERIAL Front Access and Trailblazer Front Access DMS Drive Card**

A diagnostic indicator shall be included on each drive card. This diagnostic indicator shall be in the form of four LED's. These LED's shall provide visual indication of the operational status of the LED module. At a minimum, this shall indicate failed pixel, supply voltage, operational processor, and failed communications conditions.

Data shall be received from the sign controller detailing the pixel pattern to illuminate. If communications ceases for a period longer than 10 seconds, the display module shall be blanked.

LED drive circuitry shall support a minimum refresh rate of 100 frames per second and is able to support 255 intensity levels.

Removal or failure of a single drive card shall not affect the performance of any LED display module in the DMS, except the module that it drives.

All drive cards provided shall be identical and interchangeable throughout the DMS.

#### **750J.5.4.3 Arterial Front Access and Trailblazer Front Access DMS LED Pixel Boards**

The LED pixel board shall consist only of LEDs, no driver circuitry is allowed. All LED's shall be individually and directly flush-mounted to the LED pixel board. No standoffs or plastic alignment device(s) shall be used. The LED pixel board printed circuit material shall be 0.062" , FR-4 fiberglass, and flat black printed circuit board.

Each individual pixel shall be driven as 2 strings. Failure of an LED in the pixel shall not affect the ability to control any other pixel and each pixel with in the strings shall be further connect with a zener diode that prevents the remaining LEDs in the string from failing due to a single LED failure in that string.

The LED pixel boards within a DMS model shall be identical and interchangeable.

The pixel shall consist of CREE or equivalent Amber T-1 3/4 package LEDs. These LEDs shall have a 30 degree viewing angle and have a typical color spec of 592 nm.

Pixels and modules within a DMS shall have no visible differences in illumination between them.

All materials shall be rated for outdoor usage and sunlight exposure where applicable over the environmental range expected. Each pixel is rated for 100,000 hours of field operation

#### **750J.6 CONSTRUCTION REQUIREMENTS.**

**750J.6.1 General.** The hardware and support services specified herein are intended to describe the minimum configuration that will be acceptable for a Light Emitting Diode Dynamic Message Sign. All changes to this special provision are subject to approval by the Project Manager. The Contractor shall provide all shop

drawings, schematics, material lists, fabrication details and specifications to the Project Manager for approval 30-days prior to procurement of the equipment.

All cabling and connections required to ensure the Light Emitting Diode Dynamic Message Sign is fully operational shall be furnished by the Contractor and shall be considered incidental to the system.

Any integration to communicate with the system shall be the responsibility of the Contractor and completed at the expense of the Contractor without further cost to the NMDOT.

The Light Emitting Diode Dynamic Message Sign shall include all incidental items, hardware, and equipment necessary to make the system operational (including communications to and from the TMC) and complete in all respects including all items that are not individually specified, and the items shall be furnished and installed without additional cost to the NMDOT.

The Contractor shall be responsible for locating the nearest electrical power and communication sources and connecting those sources to the DMS service switch. The Contractor shall cooperate with the local electrical and communication utilities to establish service accounts at the direction of the Engineer.

## **750J.6.2 Communications**

The sign controller shall be capable of being controlled from the central controller and/or the Dynamic Message Sign Maintenance Controller (DMSMC). The sign controller shall support dual, simultaneous communications by local (fiber) and wireless (CDMA) applications.

The sign controller shall include separate serial and Ethernet interfaces for communication with the central controller and the DMSMC. The central communication line circuit shall be multi-drop and CDMA and shall be full duplex asynchronous data transmission. The DMSMC communication line circuit shall be multi-drop RS-232 and Ethernet and shall be full duplex asynchronous data. The vendor shall provide necessary modems at the sign location. Optionally, a secure internet communication link from a remote device to the sign for maintenance response is acceptable.

The communications between the sign controller and the central controller or DMSMC shall comply with the NEMA National Transportation Communications for ITS Protocol (NTCIP). The sign controller shall support Level 2 NTCIP as identified in Section SP 750J.821, conformance level, conformance groups, objects, and minimum storage sizes and ranges specified herein.

In addition to the standard objects, the sign shall include any additional manufacturer-specific Management Information Base (MIB) objects required to support all of the sign and central software functionality defined elsewhere in this specification.

All communication lines shall be protected by surge suppression.

The sign controller shall be capable of being remotely reset from the Central Controller.

The sign shall have polling capability and at a minimum shall be capable of reporting the status of the following:

1. Current message displayed.
2. Pixel operational status that includes every string of every pixel.
3. Sign temperature
4. DC power supply status.
5. The current state (on or off) of each pixel, including any pixel errors, in the actual, currently displayed message without disturbing the message in any way.
6. Fan status (not necessary for roadside mounted).
7. Access door alarm (not necessary for roadside mounted).
8. Communication failure log.
9. Optional UPS status.
10. Communication surge protector status.
11. Operational status of the following sensors.
  - a. Each temperature sensor (not necessary for roadside mounted).
  - b. Each photocell.
  - c. Each fan failure status (not necessary for roadside mounted).
  - d. Humidity sensor (not necessary for roadside mounted).
  - e. Each power supply sensor.

The local sign controller shall be capable of performing the following functions:

1. Display a message, including static messages, flashing messages, and alternating messages.
2. It shall be possible to separately vary the flashing and alternating frequencies.
3. Flashing messages shall have the following adjustable timing:
  - a. Message time on from 0.5 to 5.0 seconds in 0.1 second increments.
  - b. Message time off from 0.5 to 5.0 seconds in 0.1 second increments.
4. It shall be possible to flash any character or set of characters in a static message.
  - a. Primary message time on from 0.5 to 5.0 seconds in 0.1 second increments.
  - b. Primary message time off from 0 to 5.0 seconds in 0.1 second increments.
  - c. Alternate message time on from 0.5 to 5.0 seconds in 0.1 second increments.
  - d. Alternate message time off from 0 to 5.0 seconds in 0.1 second increments.
5. It shall be possible to flash any character or set of characters in an alternating message at the adjustable frequencies listed above for flashing messages. The flashing period shall be a sub-multiple of the alternating on time it is associated with.
6. It shall have capabilities to diagnose and troubleshoot from:
  - a. On site laptop.
  - b. Central Control Center

NMDOT Engineer shall approve the DMSMC prior to delivery of the system. The following information shall be supplied:

1. Operating System.
2. RAM.
3. Hard drive size
4. Modem
5. Processor
6. Trade name

**750J.6.2.1 NTCIP Requirements.** This portion of the specification defines the detailed NTCIP requirements for the Dynamic Message Signs. This requirement references several standards through their NTCIP designated names. The following list provides the full reference to the current version of each of these standards. In many cases, the standard is more widely known by its original NEMA assigned number, in these cases, the NEMA number is also identified. The content of the NEMA standard is identical to that of the NTCIP standard.

Each NTCIP Component covered by these project specifications shall implement the most recent version of the standard. It is the ultimate responsibility of the vendor to monitor NTCIP activities to discover any more recent documents.

### **750J.6.2.2 General NTCIP Requirements.**

#### **Subnet Level**

Each NTCIP Component shall support NTCIP 2103 v01.05 over both a null-modem connection and a contractor-provided external dial-up modem connection. The dial-up modem shall support data rates of 28.8 kbps, 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps. The null-modem shall support the same speeds with a maximum of 19.2 kbps. Additionally, the NTCIP Component shall be able receive incoming calls as necessary and support the following modem command sets:

1. Hayes AT Command Set.
2. MNP5.
3. MNP10.
4. V.42bis.

Each serial port on each NTCIP Component shall support NTCIP 2101 (SP-PMPP/RS232) with data rates of 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps.

NTCIP Components may support additional Subnet Profiles at the vendor's option. At any one time, only one Subnet Profiles shall be active on a given serial port of the NTCIP Component. If the NTCIP Component has a serial port that supports multiple Subnet Profiles, the NTCIP Component shall be configurable to allow the field technician to activate the desired Subnet Profile and shall provide a visual indication of the currently selected Subnet Profile.

#### **Transport Level**

When using the NTCIP 2103 Subnet Profile, Each NTCIP Component shall comply with NTCIP 2202, (NEMA TS 3.Internet). When using the NTCIP 2101 Subnet Profile, each NTCIP Component shall comply with NTCIP 2201 (TP-Null). NTCIP Components may support additional Transport Profiles at the manufacturer's option. Response datagrams shall use the same Transport Profile used in the request. Each NTCIP Component shall support the receipt of datagrams conforming to any of the identified Transport Profiles at any time.

#### **Application Level**

Each DMS shall comply with NTCIP 2301, (NEMA TS 3.AP-STMF), as a Managed Agent and shall meet the requirements for Conformance Level 1 (NOTE – See Amendment to standard). SNMP shall be required and

STMP shall not be required. An NTCIP Component may support additional Application Profiles at the manufacturer's option. Responses shall use the sample Application Profile used by the request. Each NTCIP Component shall support the receipt of Application data packets at any time allowed by the subject standards.

### Information Level

Each NTCIP Component shall provide Full, Standardized Object Range Support of all objects required by these procurement specifications, unless otherwise indicated below or approved by the Project Engineer. The maximum Response Time for any object shall be 500 milliseconds unless approved by NMDOT Engineer.

The vendor's software shall implement all mandatory objects of the mandatory conformance group defined in NTCIP 1201, (NEMA TS 3.4) Global Object Definitions:

1. Configuration Conformance Group – Section 3.1.
2. Security Conformance Group (new in Amendment 1).

The vendor's software shall implement the mandatory objects of the optional conformance groups defined in NTCIP 1201, (NEMA TS 3.4), Global Object Definitions:

1. Database Management Conformance Group – Section 3.2.
2. Time Management Conformance Group – Section 3.3.
3. TimeBase Event Schedule Conformance Group – Section 3.4.
4. Report Conformance Group – Section 3.5.
5. PMPP Conformance Group – Section 3.7.

The vendor's software shall implement the following optional objects defined in NTCIP 1201 (NEMA TS 3.4):

1. globalSetIDParameter.
2. eventConfigLogOID.
3. eventConfigAction.
4. eventConfigClassDescription.

The vendor's software shall implement all mandatory objects of all mandatory conformance groups defined in NTCIP 1203, (NEMA TS 3.6) Object Definitions for Dynamic Message Signs:

1. Sign Configuration Conformance Group – Section 4.1.
2. Message Table Conformance Group – Section 4.6.
3. Sign Control Conformance Group – Section 4.7.

The vendor's software shall implement all mandatory objects of the optional conformance groups defined in NTCIP 1203, (NEMA TS 3.6), Object Definitions for Dynamic Message Signs:

1. GUI Appearance – Section 4.2.
2. Font Definition – Section 4.3.
3. DMS Sign Configuration – Section 4.4.
4. MULTI Configuration – Section 4.5.
5. Default Message – Section 4.8.
6. MULTI Error – Section 4.10.

7. Illumination/Brightness – Section 4.11.
8. Scheduling – Section 4.12.
9. Auxiliary I/O – Section 4.13.
10. Status Error – Section 4.15.
11. Pixel Error Status – Section 4.16.
12. Fan Error Status – Section 4.18.
13. Temperature Status – Section 4.17.

The vendor's software shall implement the following optional objects defined in NTCIP 1203, (NEMA TS 3.6):

1. dmsMessageBeacon – Section 2.6.1.1.1.8.6
2. dmsSWReset – Section 2.7.1.1.1.1
3. dmsMessageTimeRemaining – Section 2.7.1.1.1.4
4. dmsShortPowerRecoveryMessage – Section 2.7.1.1.1.8
5. dmsLongPowerRecoveryMessage – Section 2.7.1.1.1.9
6. dmsShortPowerLossTime – Section 2.7.1.1.1.10
7. dmsResetMessage – Section 2.7.1.1.1.11
8. dmsCommunicationsLossMessage – Section 2.7.1.1.1.12
9. dmsTimeCommLoss – Section 2.7.1.1.1.13
10. dmsPowerLossMessage – Section 2.7.1.1.1.14
11. dmsEndDurationMessage – Section 2.7.1.1.1.15
12. dmsMultiOtherErrorDescription – Section 2.7.1.1.1.20
13. dmsStatDoorOpen – Section 2.11.1.1.1.6
14. fanFailures – Section 2.11.2.1.1.8
15. fanTestActivation – Section 2.11.2.1.1.9
16. tempMinCtrlCabinet – Section 2.11.4.1.1.1 (If supported by hardware)
17. tempMaxCtrlCabinet – Section 2.11.4.1.1.2 (If supported by hardware)
18. tempMinAmbient – Section 2.11.4.1.1.3
19. tempMaxAmbient – Section 2.11.4.1.1.4
20. tempMinSignHousing – Section 2.11.4.1.1.5
21. tempMaxSignHousing – Section 2.11.4.1.1.6

The vendor's software shall implement the following tags (opening and closing where defined) of MULTI as defined in NTCIP 1203, (NEMA TS 3.6), Object Definitions for Dynamic Message Signs:

- |     |                        |
|-----|------------------------|
|     | <u>MULTI Tag</u>       |
| 1.  | Field.                 |
| 2.  | Flash.                 |
| 3.  | Font.                  |
| 4.  | Hexadecimal Character. |
| 5.  | Justification Line.    |
| 6.  | Justification Page.    |
| 7.  | New Line.              |
| 8.  | New Page.              |
| 9.  | Page Time.             |
| 10. | Spacing - Character    |

The Field Tag shall support the following field ID's:

	<u>Field Tag ID</u>	<u>Description</u>
1.	1	Time, 12 hour format (no AM/PM indicator).
2.	2	Time, 24-hour format.
3.	3	Temperature in degrees Celsius.
4.	4	Temperature in degrees Fahrenheit
5.	7	Day of week.
6.	8	Day of month.
7.	9	Month of year
8.	10	Year, 2-digits.
9.	11	Year, 4 digits.

### Sizes and Ranges

All objects required by these procurement specifications shall support all values within its standardized range, unless otherwise approved by the Project Engineer. The standardized range is defined by a size, range, or enumerated listing indicated in the object's SYNTAX field and/or through descriptive text in the object's DESCRIPTION field of the relevant standard. The following provides the current listing of known variances for this project:

<u>Object</u>	<u>Reference</u>	<u>Minimum Project Requirements</u>
NTCIP 1201 (TS 3.4)		
moduleTableEntry	2.2.3	Shall contain at least one row with moduleType equal to 3 (software). The moduleMake shall specify the name of the manufacturer, the moduleModel shall specify the manufacturer's name of the component and the modelVersion shall indicate the model version number of the component.
communityNamesMax	2.8.2	Shall be at least 4.
maxTimeBaseScheduleEntries	2.4.3.1	7
maxDayPlans	2.4.4.1	7
maxDayPlanEvents	2.4.4.2	7
maxEventLogConfigs	2.5.1	50
eventConfigMode	2.5.2.3	2,3,and 4
maxEventLogSize	2.5.3	200
maxEventClasses	2.5.5	7
maxGroupAddress	2.7.1	1
NTCIP 1203 (TS 3.6)		
dmsNumPermanentMsg	2.6.1.1.1.1	50 (Messages will be provided by NMDOT)
dmsMaxChangeableMsg	2.6.1.1.1.3	50
dmsFreeChangeableMemory	2.6.1.1.1.4	25KB
dmsMsgMultiString	2.6.1.1.1.8.3	See attached table
dmsControlMode	2.7.1.1.1.1	2,4,5 (Local, External, Central)
numFonts	2.4.1.1.1.1	4

maxFontCharacters	2.4.1.1.1.3	255
defaultBackgroundColor	2.5.1.1.1.1	0 (black)
defaultForegroundColor	2.5.1.1.1.2	9 (amber)
defaultJustificationLine	2.5.1.1.1.6	2,3,4,5 (Right, Left, Center, Full)
defaultJustificationPage	2.5.1.1.1.7	2,3,4
defaultFlashOn	2.5.1.1.1.3	0.5 to 5.0
defaultFlashOff	2.5.1.1.1.4	0.5 to 5.0
defaultPageOnTime	2.5.1.1.1.8	0.5 to 5.0
defaultPageOffTime	2.5.1.1.1.9	0.5 to 5.0
defaultCharacterSet	2.5.1.1.1.10	eightBit (2)
numActionTableEntries	2.9.1.1.1.1	15

### Documentation

Software shall be supplied with full documentation, including a CD-Rom containing ASCII versions of the following Management Information Base (MIB) files in Abstract Syntax Notation 1 (ASN.1) format:

- The relevant version of each official standard MIB Module referenced by the device functionality.
- If the device does not support the full range of any given object within a Standard MIB Module, a vendor specific version of the official Standard MIB Module with the supported range indicated in ASN.1 format in the SYNTAX and/or DESCRIPTION fields of the associated OBJECT TYPE macro. The filename of this file shall be identical to the standard MIB Module, except that it will have the extension ".man".
- A MIB Module in ASN.1 format containing any and all manufacturer-specific objects supported by the device with accurate and meaningful DESCRIPTION fields and supported ranges indicated in the SYNTAX field of the OBJECT-TYPE macros.
- A MIB containing any other objects supported by the device.

The vendor shall allow the use of any and all of this documentation by any party authorized by NMDOT for systems integration purposes at any time initially or in the future, regardless of what parties are involved in the systems integration effort

### 750J.6.3 Documentation – Arterial: Front Access and Roadside Mounted; Mainline: Walk-In and Roadside Mounted.

The Contractor shall provide manufacturer documentation for all components of the Light Emitting Diode Dynamic Message Sign, Arterial – Roadside Mounted and Front Access, Mainline – Roadside Mounted and Walk-in. The documentation shall provide a complete and precise technical description of the system equipment and materials and shall thoroughly demonstrate that the systems, including all assemblies, fully conform to all requirements of the specifications. All documentation shall be submitted to the NMDOT within 90 days after Notice to Proceed.

The Contractor shall provide two (2) sets of manuals on the operation, maintenance, and troubleshooting of all system components. The documentation shall include routine maintenance procedures and schedules for all

equipment and materials. The manuals shall be included in the bid price for the Light Emitting Diode Dynamic Message Sign.

The Contractor shall provide two (2) sets of hard copy and two sets of (2) electronic files of as-builts that provide detailed schematics of the system and shall be specific to each installation location. The as-builts shall be included in the bid price for the Light Emitting Diode Dynamic Message Sign.

#### **750J.6.4 Data Collection.**

The Contractor shall provide ESRI Shape Files with GPS coordinates of each installed ITS element to the NMDOT ITS Bureau. GPS data shall be collected in WGS84 and decimal degrees format. Contractor shall contact the ITS Engineer, (505)222-6552 prior to any data collection. The following elements include, but are not limited to: ITS manholes, ITS pullboxes, dynamic message signs, power meters, transformers, conduit, and any infrastructure between the utility drop and the associated ITS items. Data shall be logged in Excel files provided to the Contractor by the ITS Engineer. Data shall be submitted to the ITS Engineer prior to the end of the 30-DOT. Photographs shall be taken of all ITS infrastructure, including the inside of all cabinets, pullboxes, and manholes. Photographs of meter pedestals shall show the meter face and number.

Contractor shall provide information as directed by the ITS Engineer, which at a minimum shall include Project CN, Lat, Lon, mile marker, direction (as appropriate), descriptive location, manufacturer, model, serial number, and date of installation for associated elements described above.

#### **750J.6.5 Testing**

In addition to these requirements, the Contractor shall be required to demonstrate compliance with special provision "ITS System Acceptance Testing" if installation is directly to the Department's fiber optic network. Where there is a difference between the two requirements the more conservative requirement must be met.

The vendor shall, within 90 days of notice to proceed, provide a written DMS acceptance test procedure for NMDOT approval. The test shall include all items addressed in these specifications and any other requirements from the project plans or engineer. The test shall also include the use of the latest version of a NTCIP driver, (see Appendix A), to demonstrate that no proprietary protocols have been used and that the local and central software are NTCIP compliant. After the DMS is shipped from the manufacturer, testing will occur in the presence of NMDOT personnel at the contractor's yard or at a location agreed to by the NMDOT. Prior to shipping to the contractor, the manufacturer must perform factory testing to demonstrate DMS controller can support dual, simultaneous communications using both fiber and CDMA. In addition to DMS testing(s) at the factory and in the contractor's yard, DMS subsystem and system testing to ensure full the DMS is fully integrated and operable with the sign control software currently being used by the Department will occur before the DMS is accepted. The DMS must be fully integrated and operable for a minimum of two weeks without any malfunctions before being accepted.

Manufacturer must provide on-site support during the pre-acceptance period to address any equipment deficiencies.

#### **750J.6.6 Operational Support Supplies**

The Contractor shall furnish the operational support supplies listed in the table below and promptly replace any of the supplies used to perform a warranty repair.

For each group of 10 or fewer signs, provide 1 set of supplies as follows:

1 each	Sign Controller
2 each	LED Power Supplies
3 each	LED Display Modules
3 each	Uninterruptible Power Supplies
1 each	System Interface Circuit
1 each	Cable for connecting interface circuits to daughter boards
1 each	Display Module Power Cable
2 each	Surge Suppression Sets
1 each	Fan Assembly (not applicable to Roadside Mounted)
1 each	Time Relay
10 each	Every Small Fuse (<10 amp)
3 each	Every Large Fuse (> 10 amp)
1 each	Sensor for each type of sensor
2 each	Air Filter Media (not applicable to Roadside Mounted)

### 750J.7 Warranty

All equipment shall have a minimum warranty period of five (5) years from the date of acceptance. The warranty period will begin after the sign is accepted. The sign will be accepted only when full functionality, as defined in the specifications herein, have been demonstrated for a period of at least three months. Each warranty shall include actual parts and labor for any warranty work performed at the manufacturer's facility. If a repair requires more than three (3) working days to complete during the warranty period, temporary replacement equipment shall be installed until the original equipment may be reinstalled.

A copy of each written warranty shall be included and submitted by the Contractor and approved by the Project Manager prior to construction of the Light Emitting Diode Dynamic Message Sign. The NMDOT shall be designated as the holder of each component warranty. Each warranty shall indicate the manufacturer responsible for the components of the system and contact information for the manufacturer shall be provided with each warranty. The manufacturer shall be responsible for the replacement or repair of any system component that fails during the warranty period. Any replacement or repair of the system shall be done to the satisfaction of the NMDOT Project Manager or NMDOT designee during the warranty period.

Each manufacturer shall be available via telephone or pager 24 hours per day, 365 days per year for technical service assistance. This shall minimally include toll-free telephone support with emergency voice mail/paging features for after hours contact, toll-free nationwide paging, and a complete supply of repair parts and access to manufacturer's technicians to perform additional contracted services.

On-site manufacturer support will be available at the request of the NMDOT.

## 750J.8 LICENSE

When specified by the ITS Bureau, the contractor shall provide one (1) license of the current DMS control software currently being used by the Department for each Dynamic Message Sign

## 750J.9 METHOD OF MEASUREMENTS.

750J.9.1 Method of measurement will be for each. Light Emitting Diode Dynamic Message Sign complete in place.

## 750J.10 BASIS OF PAYMENT.

750J.10.1 Payment shall be made on a Lump Sum basis in accordance with the itemized list of unit costs submitted for bid item 750000 – Intelligent Transportation System.

### Pay Item

### Pay Unit

Dynamic Message Sign

Lump Sum

**NOTE:** The Contractor shall make reference to the lump sum item, **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)**, and shall enter the unit cost and total amount bid for the above-described item in the table under the appropriate description.

- Fifty percent (50%) of the per each bid price (supplied at the pre-con per the ITS Notes) for this item will be paid upon successful installation and completion of the approved on-site stand alone .
- Twenty percent (20%) of the bid price will be paid upon successful installation and completion of the approved TMC stand alone test
- Twenty percent (20%) of the bid price will be paid upon successful installation and integration and completion of the integrated system acceptance tests for all systems.
- Ten percent (10%) of the bid price will be paid upon successful completion of the 30 calendar day operational test period.

## 750J.10.2 Work Included in Payment

When a Light Emitting Diode Dynamic Message Sign is called for in the Contract, the accepted quantity complete in place will be considered full compensation for furnishing all materials, labor, tools, equipment, testing, documentation, and appurtenances necessary to complete the work as directed by the Project Manager.

The documentation of the system shall be provided by and at the expense of the contractor. All documents shall be provided to the Project Manager at least 15 days in advance of final acceptance. The documentation shall be approved by the Project Manager prior to final acceptance of the Light Emitting Diode Dynamic Message Sign.

The testing of the system components as an integrated unit shall be done by and at the expense of the Contractor under the direct supervision of the Project Manager.

The training of NMDOT staff to operate and maintain the Light Emitting Diode Dynamic Message Sign shall be done by and at the expense of the contractor under the direct supervision of the Project Manager, when specified in the contract.

Each vendor will supply their policy regarding the updating of the NTCIP to the next expected version releases if or when they are determined to be used by the state of New Mexico Department of Transportation.

## Appendix

New Mexico Department of Transportation

NTCIP DMS Driver

Programmer Documentation

V1.1

## 1. NTCIP DMS DRIVER ABSTRACT

The purpose of this document is to describe how to utilize the National Transportation Communications for ITS Protocol (NTCIP) Dynamic Message Sign (DMS) Driver ActiveX Control designed and developed by IBI Group. The intended audience for the remainder of this document is a programmer or software engineer. The NTCIP DMS Driver ActiveX Control has been developed for easy integration into any application that manages and/or monitors NTCIP Class B compliant Dynamic Messaging Signs. The NTCIP DMS Driver ActiveX Control is to reside on the computer system upon which the DMS management application operates, allowing the application to access the controls built-in DMS driver functionality. The NTCIP DMS Driver ActiveX Control provides specialized macros for simplified status polling and messaging, while allowing direct access to all NTCIP Global and DMS objects. All elements of the NTCIP Class B Profile are configurable, including serial port, baud rate, data bits, stop bits, parity, read timeout, HDLC addressing, HDLC group addressing, and SNMP community settings. The NTCIP DMS Driver ActiveX Control also possesses the automated support of NTCIP Traps (reactive SNMP Traps) and HDLC Ping trap clearance.

## 2. NTCIP DMS DRIVER ACTIVEX CONTROL PUBLIC INTERFACE V1.1

### 2.1 LICENSING

During development (driver integration), the 'NTCIP.lic' file must be collocated with the 'NTCIP.ocx' ActiveX Control file, allowing a developer to gain access to the control's public interface. To prevent software piracy, the 'NTCIP.lic' file should not be installed on the production system.

### 2.2 PROPERTIES

None

### 2.3 METHODS

#### 2.3.1 *Initialize*

(GetCommunity As String,  
SetCommunity As String,  
ControllerAddress As Long,  
GroupAddress As Boolean,  
SerialCommPort As String,  
Baud As Long,  
DataBits As Long,  
StopBits As Long,  
Parity As String,  
TimeOut As Long,  
ErrorStatusString As String) As Boolean

Call this function to initialize the NTCIP ActiveX Control, by setting all relevant communications parameters.

Accepted values are:

- For SerialCommPort: "COM1", "COM2",... (default is "COM1")
- For Baud: 300, 1200, 2400, 4800, 9600, 19200, 38400 (default 9600).
- For DataBits: 4, 5, 6, 7, 8 (default 8).
- For StopBits: 10, 15, 20 - representing 1, 11/2 and 2 bits (default 10 = 1 stop bit).
- For Parity: "NONE", "EVEN", "ODD", "SPACE", "MARK" (default "NONE").

If any other value is passed, the default will be used.

The TimeOut (serial port read timeout) value is represented in milliseconds.

If any errors occur, the relevant error message will be located in the ErrorStatusString.

### 2.3.2 SetSerialCommPort

(SerialCommPort As String,  
Baud As Long,  
DataBits As Long,  
StopBits As Long,  
Parity As String,  
TimeOut As Long,  
ErrorStatusString As String) As Boolean

Call this function to initialize the Serial Comm Port by setting all the relevant communications parameters.

Accepted values are:

For SerialCommPort: "COM 1", "COM2",... (default is "COM 1")  
For Baud: 300, 1200, 2400, 4800, 9600, 19200, 38400 (default 9600).  
For DataBits: 4, 5, 6, 7, 8 (default 8).  
For StopBits: 10, 15, 20 - representing 1, 11/2 and 2 bits (default 10 = 1 stop bit).  
For Parity: "NONE", "EVEN", "ODD", "SPACE", "MARK" (default "NONE").

If any other value is passed, the default will be used.

The TimeOut (serial port read timeout) value is represented in milliseconds.

If any errors occur, the relevant error message will be located in the ErrorStatusString.

### 2.3.3 GetSnmpGetCommunity

() As String  
Will return the GetCommunity string

### 2.3.4 GetSnmpSetCommunity

()As String  
Will return the SetCommunity string

### 2.3.5 GetControllerAddress

() As Long  
Will return the controllers address

### 2.3.6 GetGroupAddress

()As Boolean  
Will return the group address mode

### 2.3.7 SetSnmpGetCommunity

(SnmpGetCommunity As String)  
To set the SNMP GET community

### 2.3.8 SetSnmpSetCommunity

(SnmpSetCommunity As String)  
To set the SNMP SET community

### 2.3.9 SetControllerAddress

(ControllerAddress As Long)  
To set the controller HDLC address.

### 2.3.10SetGroupAddress

(GroupAddress As Boolean)  
To set group address mode.

### 2.3.11DeviceStatusPoll

(MsgStatusString As String,  
OpSmusString As String) As Boolean  
MsgStatusString       Reference to command messaging status string  
OpStatusString        Reference to operational status string  
Returned Boolean represents DeviceStatusPoll success/failure

### 2.3.12SnmpGetObject

(ObjectID As String,  
ObjectValue As String,  
MsgStatusString As String,  
Success As Boolean) As Boolean  
ObjectID               :NTCIP Object Identifier  
ObjectValue            :Reference to NTCIP Object Value  
MsgStatusString        :Reference to command messaging status string

Returned Boolean represents SnmpGetObject success/failure

### 2.3.13 SnmpSetObject

(ObjectID As String,  
ObjectType As Integer,  
ObjectValue As String,  
MsgStatusString As String,  
Success As Boolean) As Boolean  
ObjectID :NTCIP Object Identifier  
ObjectType :NTCIP Object Type (see appendix for allowed values)  
ObjectValue :NTCIP Object Value  
MsgStatusString :Reference to command messaging status string

Returned Boolean represents SnmpSetObject success/failure

### 2.3.14 DisplayMessage

(MsgStatus As String) As Boolean  
Before calling this method a message has to be created (see SetMessage). This method will instruct the selected sign to display the created message.  
MsgStatusString: Reference to command messaging status string  
Returned Boolean represents DisplayMessage success/failure

### 2.3.15 SetMessage

(NumberOfPhases As Long,  
NumberOfLines As Long,  
NumberOfCharacters As Long,  
TextLines As String)  
Set a sign message in the ActiveX control buffer. The message itself is passed through the fourth parameter, which stores the text for all and lines and phases, in the following format:

Lines must be separated with the vbCrLf character (r\n in C) - with no separator after the last line. A separator is still required in the case of an empty line. In the case of a multiphase message, lines from one phase are sequential, starting with the first phase.

Example:

```
StrTextLines = strPhase1Line1 & vbCrLf &_  
                strPhase1Line2 & vbCrLf &_  
  
                strPhase 1 Line3 & vbCrLf &_  
  
                strPhase2Line1 & vbCrLf &_  
  
                strPhase2Line2 & vbCrLf &_
```

strPhase2Line3

### 2.3.16 RemoveMessage

()

Removes the message from the buffer.

## 2.4 EVENTS

None

## 2.5 APPENDIX

Object Type Values (Tags):

NULL = 0x05

INTEGER = 0x02

OCTETSTRING = 0x04

OBJECT\_IDENT = 0x06

IP-ADDRESS = 0x40

COUNTER = 0x41

GAUGE = 0x42

TIMETICKS= 0x43