SECTION 27 42 16

INFORMATION DISPLAY SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Standard Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Passenger Information Display System (PIDS)
   2. Kiosk Information Display System (KIDS)
   3. Protocol Converter (PC)
   4. DB.25 Male Terminal Block Converter
   5. Associated mounting equipment

B. Related Sections:
   1. Section 26 05 26 Grounding and Bonding
   2. Section 34 21 04 Wire, Cable and Busways
   3. Section 26 05 33 Raceways, Boxes and Cabinets
   4. Section 26 33 53 Uninterruptible Power System
   5. Section 26 24 21 Circuit Breakers, Panel Boards, and Load Centers

C. Listing and labeling: Provide products specified in this section that are UL or ETL listed and labeled.

D. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
   1. Operating Temperature: 0 to 50 degrees Celsius.
   2. Storage Temperature: -20 to 70 degrees Celsius.
   3. Humidity Range: 5% to 90% RH, non-condensing.

1.03 REFERENCES

A. Abbreviations and Acronyms:
   1. CPU: Central Processing Unit.
   2. EMI: Electromagnetic Interference.
   3. LAN: Local Area Network.
   4. LCD: Liquid Crystal Display

5. LED: Light Emitting Diode.
6. PA: Public Address.
7. PC: Protocol Converter.
8. VMS: Variable Message Sign.

B. Reference Standards:

1. Code of Federal Regulations, Title 47 Telecommunications, Part 15 – Radio Frequency Devices (47 CFR 15), Subparts A and B.
2. MIL-I-46058C, Insulating Compound, Electrical
3. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
4. UL 50 – Enclosures for Electrical Equipment, Non-Environmental Considerations.
5. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
6. Standard for Fixed Guideway Transit and Passenger Rail Systems (NFPA 130), 2014 Edition.

1.04 SUBMITTALS

A. Product Data:

1. VMS:
   a. Include dimensions and manufacturers technical data on features, performance, electrical characteristics, ratings and finishes.
   b. Include data on features and accessories for mounting VMS.
2. Submit field test plan and documentation within 90 days prior to testing with accompanying documentation in the form of test-data recording sheets and list of proposed test equipment.
   a. Do not proceed with testing until plan and documentation are approved.
   b. Indicate test plan method of testing in order to ensure safe and orderly transition from installation, through initial energizing, to specified field testing.
   c. Include data-recording sheets as used by manufacturer for in-plant testing of equipment and devices.
   d. Indicate results that comply with requirements.
   e. Include results of failed tests and corrective action taken to achieve test results that comply with requirements.
3. Submit certified copies of test data, dated and clearly identified within two (2) weeks after completion of testing. Testing shall be witnessed by owner representatives.

B. Shop Drawings:

1. Dimensioned plans, elevations, sections and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features and ratings. Include enclosure type and detail, nameplate legend; short-circuit current rating of integrated unit.
2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer installed and field installed wiring.
3. Dimensioned outline drawing of equipment unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
4. Detailed description of anchorage devices and their installation requirements.

C. Manufacturer's factory-authorized service representatives' inspector's reports.

1.05 CLOSEOUT SUBMITTALS

A. Refer to the General Requirements and Section 01 77 50 CLOSEOUT.

B. Operation and Maintenance Data:

1. Include in manuals general theory of operation of the PIDS including description, purpose and function of VMS.
2. Include procedures for:
   a. PIDS testing
   b. Operational checks for PIDS
   c. Troubleshooting test procedures and system logic in identifying malfunctions
   d. Preventive maintenance inspection
   e. Maintenance actions to be performed by:
      1) Contractor
      2) Owner
3. Include approved shop drawings
4. Maintenance training certificates

C. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

D. As-Built Drawings on CD

1.06 QUALITY ASSURANCE

A. Qualifications

1. Manufacturers: Select a manufacturer who is engaged in production of similar Information Display products and accessories.
2. Suppliers: An authorized distributor of specified manufacturer with a minimum of three years documented experience.
3. Installers: A manufacturer authorized installer of specified products with service facilities within 100 miles of WMATA.
4. Testing Agencies: Manufacturer, Contractor, and WMATA.
5. Licensed Professionals: Authorized Installer.

B. Codes, Regulations, Reference Standards and Specifications, refer to Article 1.02 and 1.03 above.

C. Design and production tests: Perform and submit, in accordance with the General Requirements certified test results on the VMS or provide certified test results on an identical unit. Furnish certified test reports showing test data and results as well as manufacturer's comments on tests.

D. Interchangeability: Refer to Division 1 specifications of the Contract Documents. Furnish products of a manufacturer regularly engaged in the manufacture of display systems. In addition:

1. Standard commercial products shall be furnished whenever such equipment and materials will satisfy the stated specifications. Suitable modified standard commercial devices shall be furnished when required to satisfy specification requirements. Custom developed and fabricated

equipment units and devices shall be confined to those items for which suitable commercial off-the-shelf (COTS) products are not available to guarantee compliance with the Specifications. When custom design, fabrication, or assembly is required, every effort shall be made to minimize the number of different modules, solid-state devices used.

2. With each system, subsystem and facility, two or more like functions shall be performed by identical units. In no case shall the equipment or hardware used in one portion of a system, subsystem or facility be different from that used in another portion to perform the same function under similar operating and environmental conditions (outdoor display systems are distinct from indoor display systems).

3. Equipment shall be physically and plug compatible with recent versions of existing WMATA equipment performing similar functions and used for comparable applications elsewhere in similar WMATA facilities insofar as possible. The use of adapter plugs, interface boxes, and replacement mounting brackets or enclosures that fit available space and mounting holes may be allowed by the subcontractor to maintain interchangeability when competitive products that do not require such devices are determined to be unavailable (applicable to COTS major equipment items only). Custom designed and fabricated equipment must be fully interchangeable without requiring the use of such devices. If a determination is made to allow use of such devices, all necessary adapters and interface devices shall be provided with each item of equipment furnished, at no additional cost.

4. Equipment shall be software compatible with recent versions of existing WMATA equipment performing similar functions and used for comparable applications elsewhere in similar WMATA facilities.

5. Major items of equipment furnished shall be within the physical size and configuration limitations specified in provisions of this Subcontract. If such specifications are not included in the provisions, major items of equipment shall be of a physical size and configuration closely comparable to equipment currently in use of comparable applications elsewhere in similar WMATA facilities.

6. Exception: Lighter weight and smaller sized more modern versions of equipment are sought by the Contractor where their use presents significant advantages. The use of new generations of equipment that differ in size and are not fully interchangeable will be considered for approval, in order to take advantage of significant technological improvements developed by industry.

E. Qualifications of Instructor for Operation and Maintenance Training: Perform operation and maintenance training in accordance with the Division1 specifications of the Contract Documents for development and performance of operation and maintenance training for PIDS. Qualifications will be considered adequate when the following is demonstrated:

1. Instructor has in-depth knowledge of the design, packaging, operations, maintenance and trouble-shooting of the systems to be taught.

2. Instructor has been trained in teaching methods or has previous satisfactory experience in teaching with emphasis on the subject matter to be covered in the course of instruction.

1.07 QUALITY CONTROL

A. Refer to Division 01 General Requirements and Section 01 47 00 Quality Management System.

B. All software and hardware shall operate seamlessly with the existing PIDS and KIDS.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Ship each unit securely packaged and labeled for safe handling in shipment and to avoid damage or distortion.

B. Temporary Bracing: Where necessary, brace each unit for hoisting, lowering and sliding into position. Temporary bracing of the equipment labeled as follows: TEMPORARY – REMOVE BEFORE OPERATION.

C. Protection against Concealed Damage: Include within shipping container; mechanical impact recorder of rating recommended by the manufacturer for shipment by railroad and submit in accordance with the General Requirements impact chart with manufacturer's recommendations for disposition of damaged materials.

D. Store equipment in secure and dry storage facility.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Listing and labeling: Provide products specified in this section that are UL or ETL listed and labeled.

B. VMS

1. Message Storage - Each VMS shall have the ability to store a minimum of one hundred 50-character messages. The user shall be able to retrieve any stored message for display from local VMS storage using the VMS Server control software.
   a. Shall have the capability of displaying and broadcasting emergency messages.
2. Fonts - An extensive font set shall be included with the VMS.
   a. Shall meet ADA requirements for signage.
   b. Shall include a robust character set containing all characters required to express messages in standard Spanish and English languages.
   c. The character sets shall include upper case, lower case, numerical digits, non-alphabetic and non-numeric special characters
3. Self-Diagnostics - Each display may be polled by the server to retrieve the status of each sign.
   a. When messages are sent to the display an 'ACK' is sent back acknowledging the received message was valid and complete. If a message was corrupted or fragmented, the display will send back a 'NAK' for, message not received.
      1) This will also serve as verification to the overall health of the display. A timer can be set in the sign so that after a pre-determined period of time, if the display does not receive ANY message or command, the display will then reset itself, or go 'blank' until it receives a new message or command.
4. Environmental Design - The proposed VMS equipment shall be designed and manufactured to withstand a harsh transit environment including the effects of weather conditions on outdoor deployed equipment.
   a. Operating temperatures will be from -20 degrees Celsius to +50 degrees Celsius (-4 degrees Fahrenheit to 122 degrees Fahrenheit).
   b. All electronic components will be sealed using conformal coating.
   c. Shall be designed to resist electromagnetic interference (EMI).
   d. Outdoor units shall be waterproof and sealed against particulate matter invasion such as steel and other metallic particulate matter typically found in a transit environment. The hardware will be modular and designed for ease of service.

C. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Operating Temperature: 0 to 50 degrees Celsius
2. Storage Temperature: -20 to 70 degrees Celsius

3. Humidity Range: 5% to 90% RH, non-condensing

2.02 COMPONENTS

A. PASSENGER INFORMATION DISPLAYS (PIDS)

1. Basis of Design: GDS Model No. G4600106.
2. VMS General Description: Four-line, tri-color (Red, Green, Blue) Display, with full text, and graphics capability, outdoor enclosure.
3. Equipment: Modular type, using solid-state components, fully rated for continuous duty.
4. Waterproof Equipment: Listed and labeled for duty outdoors or in damp locations.
5. VMS Finishes:
   a. Paint Finish: VMS painted Metro Benjamin Moore, Stonington Gray, #Hc-170, as required.
   b. Metallic Finish: All metallic housing components and fasteners shall be corrosion resistant.
6. LCD Display Specifications.
   a. Basis of Design: GDS Model No. G4600106
   b. Display Colors: 16.7 Million Colors (Maximum)
   c. Viewing Angle: 176° (H) 178° (V) with CR ≥ 10.
   d. Active Display Area: 46"
   e. Resolution: 1920 x 1080.
   f. Pixel Pitch: Industry Standard (outdoor and indoor)
   g. Contrast Ratio: 4000:1
   h. Brightness: 1500 cd/m2
   i. Backlight: LED.
   j. Video: VGA, DVI-D, HDMI.
   k. Power Consumption: 300W.
   l. Electrical: 85 to 264 VAC, 47-63 Hz.
   m. Luminance (nits typ): 850 nits.
   n. Operating Temperature:
      1) Maximum: +50°C (+122°F)
      2) Minimum: -30°C (-22°F)
   o. Life Expectancy: 87,600 hours.
   p. Lines of text (Maximum): 4.
   q. Character Height: 3.3 inches.
   r. Characters per line:
      1) 20-24 single high characters.
      2) 17 double high characters.
   s. Enclosure Dimensions: 27.83"H X 46.85" W X 8.66"D (Single-sided).
   t. Weight: 110lbs
7. VMS Housing: Case material shall be Aluminum.
8. VMS Service Access: Each PIDS shall be mounted far enough from the platform edge so as not to foul train movement when being serviced. All internal electronics and components shall be accessible through bottom.
9. Each enclosure shall be equipped with a keyed power switch that is capable of rebooting power to the back plate(s). The switch shall be made accessible through the bottom of the enclosure.
10. Each VMS shall have an electrical disconnect provided within line of sight of sign to allow isolation of each ungrounded conductor in accordance with National Electrical Code.
11. Display Capability: Programmable alphanumeric and graphic.
12. Clock: Built-in time and day.
13. Message Storage: Greater than 100 50-character messages.

14. Message Storage: VMS Standard Font Heights:
    a. Note that the ADA standard is a minimum of 3" for any sign mounted over 80-inch high. All transit information displayed shall be a minimum of 3 inches.
15. VMS Fonts: Narrow, Bold, Wide, ADA compliant aspect ratios. VMS Background: Matte black.
16. Conformal Coating: Circuit boards conformal coated to MIL-I-46058C.
17. Addressability: Individual two-byte address allows 255 displays with zone assignment allowed.
18. VMS Temperature Monitoring and Cooling Temperature sensor will read internal temperature and report the temperature to the server when polled. Over temp thermostat will disable power to the sign should the temperature go past a pre-set limit of about 140 degrees F. When power is cut off, the sign will appear to the server as being disabled since all communications will be severed with power loss to the display.
19. Integrated 10/100 BaseT TCP/IP Ethernet Communications support.
20. PIDS Plug-In Accessories Power Requirements: Emergency power, 120 V, 1 KVA in the communications room.
21. Platform VMS Electrical Power Service Requirement: A 1-pole, 120 V, 20 A circuit shall be provided from the Communications Room and terminated in a NEMA 4X rated disconnect (safety) switch near where the VMS will be located. The disconnect (safety) switch shall provide input power to the platform VMS.
22. Mezzanine VMS Electrical Power Service Requirement: A 120 V, 20 A circuit shall be provided from the nearest Emergency Panel to where the mezzanine VMS is located.

B. **KIOSK INFORMATION DISPLAY SYSTEM (KIDS)**

1. Basis of Design: Ciil Model No. CL-47PLC68.
2. VMS General Description: Four-line, tri-color (Red, Green, Blue) Display, with full text, and graphics capability.
3. Equipment: Modular type, using solid-state components, fully rated for continuous duty, unless otherwise indicated.
4. Waterproof Equipment: Listed and labeled for duty outdoors or in damp locations.
5. VMS Finishes:
    a. Paint Finish: VMS painted Metro Benjamin Moore, Stonington Gray, #Hc-170, as required.
    b. Metallic Finish: All metallic housing components and fasteners shall be corrosion resistant.
6. LCD Display Specifications:
    a. Product: Ciil Model No. CL-47PLC68.
    b. Display Colors: 16.7 Million Colors (Maximum).
    c. Viewing Angle: 178° vertical/horizontal.
    d. Active Display Area: 47".
    e. Resolution: 1920 x 1080.
    f. Aspect Ratio: 16:9
    g. Brightness: 700 cd/m2
    h. Backlight: LED.
    i. Video: VGA, DVI-D, HDMI, S-Video, RCA.
    j. Power Consumption: 235W.
    k. Safety: UL/FCC Class B.
    l. Operating Temperature:
        1) Maximum: +60°C (+140°F).
        2) Maximum: +60°C (+140°F).
7. Life Expectancy: 87,600 hours
8. Lines of text (Maximum): 4

9. Character Height: 3.3 inches
10. Characters per line:
    a. 20-24 single high characters.
    b. 17 double high characters.
11. Weight: 110lbs.

C. Display Capability: Programmable alphanumeric and graphic.

D. Clock: Built-in time and day.

E. Message Storage: Greater than 100 50-character messages.

F. Message Storage: VMS Standard Font Heights:

1. Note that the ADA standard is a minimum of 3" for any sign mounted over 80-inch high. All transit information displayed shall be a minimum of 3 inches.

G. VMS Fonts: Narrow, Bold, Wide, ADA compliant aspect ratios. VMS Background: Matte black.

H. Conformal Coating: Circuit boards conformal coated to MIL-I-46058C.

I. Addressability: Individual two-byte address allows 255 displays with zone assignment allowed.

J. Integrated 10/100 BaseT TCP/IP Ethernet Communications support.

K. KIDS Plug-In Accessories Power Requirements: Emergency power, 120 V, 1 KVA in the Kiosk.

L. Kiosk Electrical Power Service Requirement: A 120 V, 20 A circuit shall be provided from the Kiosk or nearest Emergency Panel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installer Qualifications: An experienced installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this section

B. The Contractor is to run the communications wiring and conduit in accordance with the WMATA Design Criteria.

C. Install transmission media where applicable without damaging conductors, shield, or jacket. Do not bend cable, in handling or installation, to smaller radii than minimum recommended by manufacturer.

D. Identify cables according to Section 34 21 04

E. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom. ADA requires a minimum mounting height of 80"; if less, barriers must be provided.

F. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other locations.

G. Install equipment level and plumb and according to manufacturer's written instructions.

H. Arrange equipment to provide adequate spacing for access and for circulation of cooling air.

3.02 FIELD QUALITY CONTROL

A. Field Testing and Inspection:

1. General:
   a. Conduct field inspection and field testing at each station to ensure proper operation of PIDS equipment and devices provided.
   b. Operation and protective-device setting: the Contractor is responsible for setting and calibration of protective devices for proper operation during field testing.
2. Field Inspection:
   a. Prior to field testing, check equipment installation in accordance with manufacturer's recommendations.
3. Field Testing:
   a. Furnish equipment to perform test.
   b. Provide services of manufacturer's engineering representative and supporting field crew for a period not less than three man-days. Conduct tests in the presence of the Engineer. Perform tests in accordance with approved test procedure.
4. All conductors (power and communication) shall be meggered and continuity tested.
5. Certify compliance with test parameters.
6. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Demonstration: Engage a factory-authorized service representative to train Owner's operations and maintenance personnel to adjust, operate, and maintain systems.

1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
2. Train designated personnel in management and messaging operations.
3. Review data in maintenance manuals.
4. Schedule training with Owner, through Authority's Training Office.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installations, including connections. Report results in writing.

D. Field-Testing Personnel:

1. When more than one representative is involved, the Contractor shall ensure proper coordination.
2. Provide engineering, technicians and journeymen personnel as necessary to set-up and implement testing.

E. Authority Tests:

1. The Authority reserves the right to require the Contractor to conduct acceptance tests on each VMS at each passenger station within one-year after installation.
2. In order to perform VMS tests, the Contractor may re-create test conditions of applicable standards to the extent possible without disturbing existing structure or installed equipment or materials.

F. Submit certified test reports.

END OF SECTION