UNIVERSITY OF SOUTH CAROLINA

AMENDMENT NO. 1 TO SOLICITATION

TO: ALL VENDORS

FROM: Charles Johnson, Procurement Manager

SOLICITATION NUMBER: USC-RFP-3381-CJ

DESCRIPTION: Furnish, Deliver and Install New HD Video Scoreboard for Founders Park

DATE: October 22, 2018

This Amendment No. 1 modifies the Request for Proposals only in the manner and to the extent as stated herein.

Section III Scope of Work / Specifications of the solicitation has been revised/modified.

BIDDER SHALL ACKNOWLEDGE RECEIPT OF AMENDMENT NO. 1 IN THE SPACE PROVIDED BELOW AND RETURN IT WITH THEIR BID RESPONSE. FAILURE TO DO SO MAY SUBJECT BID TO REJECTION.

_____ _____

Authorized Signature Name of Offeror

_____

Date

SECTION III SCOPE OF WORK / SPECIFICATIONS HAS BEEN REVISED/MODIFIED AND NOW READS AS FOLLOWS:

III. Scope of Work / Specifications

DELIVERY / PERFORMANCE LOCATION – PURCHASE ORDER (JAN 2006): After award, all deliveries shall be made and all services provided to the location specified by the Using Governmental Unit in its purchase order.

1. GENERAL

1 GENERAL REQUIREMENTS

1 LED display manufacturers and direct sale representatives are invited to provide a proposal based on specifications provided in this document for the University of South Carolina.

2 All requirements in this section of the solicitation as well as in other sections of the solicitation, Referenced Documents or Practices, and any Amendments to the solicitation shall be considered a part of this section. Each Offeror to the solicitation is responsible for becoming thoroughly familiar with all its contents as to requirements which affect this Section. Contractor is responsible for coordinating all items of this section with the Owner and Consultant to insure that all items of this section are furnished in accordance with Owner standards.

2 REFERENCES

1 National Fire Protection Association (N.F.P.A.).

2 American National Safety Institute (A.N.S.I.).

3 National Electrical Code (N.E.C.).

4 Underwriters Laboratories (U.L.).

5 Electronics Industries Association (E.I.A).

6 Standard for Electric Signs, UL-48.

7 Standard for Control Centers for Changing Message Type Signs, UL-1433.

8 Federal Communications Commission Regulation Part 15.

9 Project Drawings

3 DEFINITION OF TERMS AND ABBREVIATIONS

1 Provide: to supply and install.

2 Supply: to supply but not install.

3 Install: to install but not supply.

4 OFE: Owner furnished (supplied) equipment. Equipment will be provided to contractor for installation.

5 NIC: Not In Contract. Refers to items that are not included in the scope of work outlined in this section but may be shown for coordination purposes or reference.

6 Future: Equipment that will be provided by owner at a later date. Accommodations shall be provided for future equipment as shown on the drawings.

7 Contract Documents: This specification and included conceptual display drawings (TD.xx)

8 Consultant: Idibri Consulting

9 Owner: University of South Carolina

10 VM: Value Management

4 RESPONSIBILITY AND RELATED WORK

1 Coordinate scheduling of work with the Owner.

2 The systems described in this section will be called the “Display Systems” and the installer will be named “The Contractor.” The Contractor will provide all labor, materials, equipment, necessary tools, test equipment, hoisting, transportation, supervision and coordination necessary to complete the installation of the “Display Systems” as described in the construction documentation.

3 The Contract Documents are intended to include or imply all items required for the proper execution and completion of the work.

4 The Display Systems consist of the materials, equipment and systems described in this specification, related drawing details, and any schedules that are part of the contract documents. This Contract is for equipment, material, installation and training. The work of this section includes complete and operational Display Systems.

5 The Contractor will provide minor accessories, such as connectors, adapters, matching devices and equipment items needed for a complete system, even if not specifically mentioned herein or on the drawings, without claim for additional payment.

6 The Contractor shall provide complete, turnkey Display Systems, fully tested and ready for intended use according to the design intent of the contract documents.

7 Obtain all insurance, bonding, licenses and permits necessary to complete the work, and for operation by the Owner.

8 Contractor will comply with all union jurisdiction and prevailing wage requirements for the completion of the project.

9 If a conflict is identified between the Contract Documents and the appropriate codes and is reported to the Owner and confirmed prior to contract award, the Consultant will prepare the

necessary clarification or revision. When a conflict is reported after contract award, the Contractor will propose a resolution of the conflict and, upon approval, perform related work.

10 Coordinate with other Contractors as required and in a timely fashion to convey all information (scheduling, structural, electrical, technical or otherwise) necessary to complete the project.

11 The Contractor shall be responsible for:

1 Verification of dimensions and conditions at the project for the display and control equipment locations prior to ordering/manufacturing.
2 Submittal of structural calculations with the shop drawing submittals concerning final connection of display to provided steel. Calculations and shop drawings shall be sealed and signed by a South Carolina licensed Structural Engineer retained by the Contractor. This will be for the final connection from the provided steel tubing to the display.
3 Provision of all transportation and hoisting.
4 Furnish protective covering during construction/installation to prevent damage or entrance of foreign matter.
5 Replace at no expense to Owner/project, product damaged during delivery, storage or handling.
6 Provision of safe and protected storage. The owner takes no responsibility for damage or theft relating to negligence in failure to secure equipment by The Contractor.
7 Installation in accordance with the Contract Documents, manufacturer's recommendations, and all applicable code requirements.
8 Provision of complete assemblies (sub-structure, enclosure, and finishes) and all necessary attachment hardware, and framing.
9 All required material for a complete water tight enclosure including front border metals to protect and finish out the display systems. All displays to include a 2” metal framing border or as specified around the entire display.
10 Provision, termination and testing of all necessary electrical power, signal cabling, and remote operation control cabling. All panel and branch circuit distribution is by others.
11 Provision of all transmission, processing, receiver electronics to distribute control signals to the display.
12 Coordination of any installation of rack mounted devices into equipment racks (provided by others) with other related trades with equipment in the same space.
13 Connecting ground point to all equipment in accordance with NEC code and standards specified. Coordinate with Division 26.
14 Provision of a dielectrically insulated ground joint connection that will isolate any conduit systems from the chassis of the rack where conduits enter any equipment racks furnished under this section.
15 UL Certification of all pertinent equipment including control and display systems attached with identification labels. If any equipment requiring certification is not UL Certified, then The Contractor shall arrange onsite inspections and certification at no additional expense to the contract/project.
16 All control equipment to operate the display shall be located in the facilities’ control room at Founders Park. Any necessary signal/control conduit and cable raceways for cable runs to and from display components will be provided by others. All fiber to be provided by the Contractor.
17 All submittals detailed within the Contract Documents
18 Initial tests and adjustments
19 Final performance testing, calibration and adjustment prior to first use.
20 Maintenance services contract, warranty for equipment and workmanship.
21 Provision of required shelving and inventory labels for all spare equipment.
22 Provisions of pre-event cleaning of the displays within 14 days of the first event held in facility for the first year.
23 Provide protection for the existing finishes during installation. Any damage caused during construction is the full responsibility of the Contractor to repair or replace at no additional cost.

24 Contractor to remove/dismantle all existing displays. Coordinate with Owner for repurpose or disposal. This contract should not include labor for repurposing, just the removal. Keep the 'Home of Carolina Baseball' and Founder's Park signs.
25 Provide protective netting over the front of the entire display.

5 PROJECT SCHEDULE

1 Coordinate with the Owner for all final scheduling of work. The outline below is intended to provide guidelines for bidding purposes only.
1 Bidding: October - November
2 Award & Release: November
3 Construction: November - January
4 Demo: December
5 Install On-Site: January – February
6 Substantial Completion – February 4, 2019

6 SYSTEMS DESCRIPTIONS

1 Demolition
1 Remove and dispose of the existing digital and static signs from the existing outfield display structure.
2 Remove and dispose of the existing static scoring display that hangs from the pressbox balcony.

2 Outfield Display
1 It is understood that The Contractor's manufacturing processes, electronics, enclosure requirements and display module sizes may dictate the final manufacturer's offering.
2 Dimensions indicated are ideal target active video area unless otherwise noted. Final dimensions to be no more than 5" larger or no less than 5" smaller than the specified dimensions.
3 The Left Field Display Systems work includes (LFD):
1 One (1) 43'-6"W x 33'-7"H 16mm (physical pixel-to-pixel density), or 12-13mm (virtual pixel-to-pixel density), rear serviceable, shall accept high definition 1080p60 (maximum) video inputs and then scale to the displays native resolution, full color LED pixel large screen display system including all related control and processing systems required to make a "complete operating system" as detailed in Part 2.
2 Provide all secondary support structure necessary to connect to the existing primary structure.

3 Fixed Digit Score Board.
1 Provide a 36'W x 9'-4"H Fixed Digit Scoreboard to display Time, At Bat Ball, Strike, Out, Pitch Speed, and Team Names.
1 Time, At Batt, Ball, Strike, Out, and Pitch Speed to be 24"H.
2 All other digits to be 18"H.
3 All digits to be White.
4 Home and Guest names to be dynamic matrix to change team names.
2 Provide a 40'W x 2'6"H Fixed Digit Scoreboard to display Inning, Ball, Out, MPH, and Team Names.
1 All digits to be 24"H.
2 All digits to be White.
3 Home and Guest names to be dynamic matrix to change team names.

4 Hardware Based Scoring and Timing Control System.
1 Provide scoring system with a connection in the press box.

2 Scoring information to be sent to the truck dock for direct insertion into the truck character generator.
3 Provide scoring data distribution in the rack room with fiber extension to send back to the on-campus video production control room.
4 Provide primary and backup scoring consoles.

5 Full System Base Warranty, 5 Years.
1 Warranty to include at no cost to the owner:
1 Factory repair of failed parts
2 Shipping to and from the site.
3 Labor to replace failed parts.
4 Reconfiguration and recalibration of any display due to a failure.

6 Maintenance Plan
1 Provide 2 technicians for the following:
1 3 Days onsite for Pre-Season startup maintenance.
2 Event Day coverage including startup and adjustments as required for 5 events.

7 Scoring Equipment
1 Provide all equipment, cabling, installation, and training for the following scoring equipment:
1 Two event controllers with cases
2 Two locker room clocks. Clocks to operate wirelessly.
3 Central data distribution panel to feed data in the local production room and the truck dock.

8 Outfield Display – **ALTERNATE #1**
1 Provide alternate pricing for the main display. This will move the static display to be mounted partially below the main structure. Provide all required structure to mount the static display.
2 The Left Field Display Systems work includes (LFD-A):
1 One (1) 43’-6”W x 37’-7”H 16mm (physical pixel-to-pixel density), or 12-13mm (virtual pixel-to-pixel density), rear serviceable, shall accept high definition 1080p60 (maximum) video inputs and then scale to the displays native resolution, full color LED pixel large screen display system including all related control and processing systems required to make a “complete operating system” as detailed in Part 2.
2 Provide all secondary support structure necessary to connect to the existing primary structure.

7 SUBMITTALS

1 BID SUBMITTALS
1 Offeror’s bid shall be valid for 120 days without claim for additional payment.
2 Offeror must have previously installed at least five jobs using similar product and similar display size to the job described in the solicitation. The jobs of similar product must been completed within the last five years within the USA. In your proposal, submit name, phone number, and current email address of contact person for each representative project reference. Also, in your proposal, identify at least one such completed job available for inspection by the Consultant and Owner’s Representatives.
3 In its proposal, Offeror will confirm in writing that it has at least five years of experience with equipment and systems of the types specified in the solicitation, that it maintains a fully staffed and equipped service facility in the region of the United States that includes South Carolina, and that it is franchised dealer and authorized service facility for any equipment used on the contract project not manufactured by the offeror, and that the offeror is properly licensed to work in the project home state (South Carolina).

4 In its proposal, Offeror must summarize their process to include but not limited to procurement of LEDs, module assembly, cabinet assembly, quality control points and final testing procedures.

5 In its proposal, Offeror will confirm in writing that any Sub-contractor it uses in performance to contract has five years of experience with the primary contractor's / offeror's equipment and systems and that the subcontractor's company is properly licensed to work in the project home state (South Carolina). In its proposal, Offeror will identify all Subcontractors on the Proposal Response team and provide a detailed scope of work for each Subcontractor it plans to use in performance to contract.

6 In its proposal, Offeror will submit resumes of its project manager, lead engineer and lead installers that will be working on the contract project. This will include key team members of any Sub Contractor that the offeror plans to use in performance to contract. Resumes must be submitted with offeror's proposal response.

7 In its proposal, Offeror will submit preliminary power requirements for its proposed display, submit viewable dimensions and horizontal/vertical physical pixel count of its proposed display, submit preliminary total weight and structural calculations for its proposed display.

8 In its proposal, Offeror will submit a schedule to indicate durations for shop drawing submittal, procurement, and fabrication, shipping requirements, installation timelines for each major system and test and commissioning sessions. Coordinate these milestone dates in the schedule with project schedule and intended completion dates for the contract project in the solicitation.

2 PROJECT SUBMITTALS:

1 Product Data Submittal: Contractor shall submit manufacturer's product data sheets for each item of equipment to be used for the contract project in electronic form via email as PDF electronic files.

2 Shop Drawings Submittal: Contractor shall indicate complete details and dimensions of work to be performed and indicate types and locations of equipment, fabricated equipment, and other details to completely describe work to be performed.

3 Contractor shall submit the above information via email as PDF electronic files for review and distribution to the Owner and the consultant. There shall be no contract work authorized on site without the prior submittal of a complete set of shop drawings. Any exceptions to this contractual requirement must be in writing and approved by the Owner. Details to include the following:

1 Plan, Elevation and Section Views of the displays.

2 Drawings showing and connection of the installer supplied equipment to the structure at each different condition.

3 Wiring diagrams. Complete, detailed wiring diagrams for all systems including cable types, identification and color codes, and detailed wiring of connections, both at equipment and between equipment racks and wiring in conduit.

4 Location of all equipment in racks, consoles, millwork, enclosures with dimensions; wire routing and cabling within housings; AC power outlets, terminal strip and UPS locations.

5 Conduit riser diagrams for all systems.

6 Schematic drawings of any custom circuitry or equipment modifications, including connector pinouts and component lists.

7 Equipment rack elevations.

8 Schedule of terminations for all systems.

9 Terminal strip layouts for all proposed terminal strips.

10 Power consumption at 50 % and 100 % illumination levels for each display.

3 CONTRACT CLOSEOUT SUBMITTALS

1 Contractor shall keep a single complete set of approved shop drawings on the project site for the full duration of the project until after the final system commissioning. Contractor shall note any changes made during installation on these single set of drawings.

Contractor shall submit three corrected sets of reproducible drawings showing work as installed. All “as-built” drawings are to be submitted both in electronic form (ACAD 2012 or later) and in hard copy (42”x30”).

2 Owner Reference Manual: Before owner training commences, Contractor shall submit the following as Adobe .pdf files on 3 CD’s or USB drives and as hard-copy in a single 3 ring binder with project title. Contractor shall submit individual sub-directories/tabular dividers with the following headings:

1 A legend with acronyms and abbreviations.
2 A catalog of all equipment, organized by manufacturer, model, serial number, including the room and rack number where the device is located.
3 System Operation Instructions: Narrative verbiage with photographs and diagrams detailing operational procedures for all equipment as a system.
4 Manufacturer's User Manuals for all equipment.
5 Warranty Information for all equipment. Include warranty period and service department contact information.
6 System Maintenance Instructions: Narrative verbiage with photographs and diagrams detailing owner’s responsibilities for preventative maintenance to include schedules and any specific products, procedures or specialized/custom tools required for maintenance of the display system.
7 As-Built Drawings fully legible at C size (24”x18”) bond folded appropriately for binder.
8 A list of all test results performed on the systems as outlined in Section 3.4 proving the systems to be in full compliance.
9 A list of spares in inventory to include quantity, manufacturer, model number, and serial number.

8 CODE COMPLIANCE

1 All work performed by the Contractor and materials used by the Contractor in performance to the contract shall comply with all applicable codes and regulations to meet or exceed Federal, State, City, and Local Building Codes and Regulations (including seismic). Contractor shall advise the Owner if anything in the Drawings or Specifications is out of compliance with codes and/or laws prior to proposal submission.

9 PROJECT CONDITIONS

1 Contractor shall notify the Owner in writing of any issues on the job site negatively affecting the contractor’s pursuance of work under their scope. Contractor shall submit recommendations for resolution and assist in coordinating solutions with other trades.

2 Contractor shall verify position and elevation of structure and its layout for display equipment. Contractor shall verify dimensions by field measurements.

3 Contractor shall verify mounting structure can support the display system weight loads in addition to any required attachment and structural support metals.

4 Electric circuits and whips to connect to each display cabinet at each catwalk level for the display will be provided by the owner.

10 GUARANTEES

1 Contractor shall warrant labor and materials on the display systems for five (5) years following the date of Final Owner Acceptance as base offering.

2 Within the warranty period, Contractor shall:
   1 Make available an exchange program to supply replacement parts for components that fail during the coverage period. To minimize downtime, the exchange parts will be shipped on the same day the order is received or on the following day. The manufacturer will also enclose an air bill for return of the defective components.
   2 Make available a help desk staffed by experience technicians and coordinators who are thoroughly familiar with the scoreboard and matrix display products and available for technical support. This contractor help desk staff must be available at no additional cost to the customer and provide an "on-call" service during weekends.
   3 Make available access to a local Authorized Service Company that can repair or replace any faulty item the next day without charge, including parts and labor and assist owner's staff in replacing, reprogramming or recalibrating this equipment to make entire system functional.

3 This warranty shall not void specific warranties issued by manufacturers for greater periods of time. Nor shall it void any rights guaranteed to the Owner by law.

4 Contractor will make available to Owner the exact beginning and ending dates of the warranty period. Include the name of the person to call for service and telephone number. This information is to be part of Project Record Set.

5 Contractor shall submit alternate pricing for extended maintenance contracts on displays and control systems based on the above criteria.

2. PRODUCT

1 MANUFACTURERS

1 Recommended Display Manufacturer's and Direct Sale Representatives.
   1 Manufacturers identified in this specification are listed as a standard of quality. Regardless of the length or completeness of the descriptive paragraphs herein, each device included in proposals submitted by offerors shall meet or exceed all of the specifications. It is the offeror's responsibility to verify performance of intended equipment as required prior to proposal submittal.
      1 Daktronics
      2 Formetco
      3 Mitsubishi
      4 Panasonic
      5 Samsung/Yesco

      NOTE: If it is determined during the evaluation process that each device included in an offeror's proposal does not meet all the specifications, then that offeror's proposal will be deemed "non-responsive" and removed from further consideration.

2 All equipment supplied will be new and meet the latest published specifications of that product. Take care during installation to prevent scratches, dents, chips, etc.

3 If product is discontinued and/or no longer publicly advertised as a part of a manufacturer's current product line-up at time of installation, the project team reserves the right to request a substitution of product for new and currently offered product of like function fulfilling the design intent. Substitution value will be based on fair market value of original product at time of bid.

2 SYSTEM REQUIREMENTS

1 Technical and Engineering Standards
- 1 General
  - 1 Large format display systems shall allow repair from the rear and shall allow “hot” repair while the system is operating.
- 2 LED Display Systems
  - 1 The display systems will be comprised of full color LED pixel technology capable of 10,000 cd/sq.m pixel brightness with full white (100 IRE) input.
  - 2 Brightness of individual adjacent LED’s must vary no more than 2%, and no more than 10% across the entire display.
  - 3 Minimum effective color pixel density of 3,800 pixels/m2 with LED physical pixel density of 16mm in a flicker less display.
  - 4 Minimum effective color pixel density of 2,800 pixels/m2 with LED virtual pixel density of 10-13mm in a flicker less display.
  - 5 The display system will be equipped with an illumination sensor exterior to the display and allow for both automatic and manual control of preset illumination levels in at least 20% increments up to 100%.
  - 6 The display must be capable of 140 degree minimum horizontal angle of viewing and 30 degree upper and 60 degree lower minimum vertical angle (defined at 50% brightness and zero color shift).
- 3 Control and Signal Processing/Distribution Systems.
  - 1 The Contractor shall provide all user interface, transmission, and processing software; all electronics; and all cabling to independently place, size, tile, layer, and control High Definition (HD-SDI SMPTE 292M) input signals on the displays.
  - 2 All SDI video signals will be handed off in the pressbox control rack room.
  - 3 Primary and redundant video signals will be provided by the owner. A total of 4 signals will be fed from a local router; 2 primary, 2 redundant.
  - 4 The Contractor is not responsible for media playback servers for the game presentation.
  - 5 The Contractor is responsible for providing a single media playback device for an emergency message on a minimum 30’ x 4’ portion of displays.
  - 6 All control equipment to operate and provide signal to the displays shall be located in the pressbox control rack room. The Contractor shall provide all connections, cabling, and terminations between display, operating equipment, and the pressbox control rack room.
  - 7 The Contractor will provide systems for remote power up and shut down of the displays, systems will allow displays to be turned on and off from the video production equipment room in addition to within the displays.
  - 8 The Contractor shall provide one remote control user interface station in the pressbox control rack room to provide complete control of system input, display power up/down, freeze, position, size, aspect ratio, color, hue, contrast, brightness and delay for use in setup, testing and operation.
    - 1 NEC EA244WMI-BK 24” LED Display
    - 2 Chief Mfg FSA1015B 19” Rack Mount
    - 3 Chief Mfg FTR4100 Vesa Mount
    - 4 Middle Atlantic RM-KB Keyboard Drawer
    - 5 IHSE R474-BSHC KVM Extender
  - 9 The Contractor shall provide computer interfaces for all CPU devices in their scope.
    - 1 IHSE L474-BVHC KVM Extender
  - 10 The Contractor shall provide the KVM matrix frame and fiber extender to connect back to the main production control room. The Contractor must supply a larger matrix if there are more than 6 CPUs to connect.
    - 1 IHSE 474-BODY6BP Chassis (Qty: 1)
    - 2 IHSE Tera K480-16C 16-Port Matrix (Qty: 1)
    - 3 IHSE 480-B4 Software (Qty: 1)
    - 4 IHSE 474-6RMK Rack Mounts (Qty: 1)

5 IHSE 474-BLNDI (Qty: 2)
6 IHSE 485-BX (Qty: 2)

11 Processing and control equipment shall allow for external control of input selection and transitions via GPI triggers and/or RS-422/232 serial control protocols such as E-MEM or P-BUS.

12 Processing and control equipment to receive an emergency contact closure and to display an emergency message independent of any video production control equipment.

13 The Contractor will provide backup processing and transmission equipment in duplication of primary systems with equipment for manual switchover, distribution amplification, and/or splitting of all necessary control, data and signal cabling.

14 The Contractor shall provide Diagnostic Software to assist the Owner in diagnosing, isolating and repairing deficiencies in the display and control system, including defective elements.

15 The Contractor shall provide uninterruptible power supply systems for all computer interface and computer processing systems sufficient to allow proper shut down of operating systems in a power outage.
1 APC Smart-UPS 1500VA RM 2RU LCD 120V (Qty: 2)

16 The Contractor to provide new sports interface for scoring and to be located on the floor at the scorer's table and shall interface will all existing back of house and goal shot clocks.

17 The Contractor shall provide a stats interface to a broadcast character generator (by others) that will port data and be displayed on the main screens via the broadcast switcher.

18 The Contractor shall provide a stats interface to feed the truck dock.

19 The Contractor shall provide a 16x16 router with input and output patching in the production rack room.
1 1) Evertz EQT-1616-3G (Qty: 1)

4 Control and Signal Processing/Distribution Cabling

1 Installation shall include all required and operationally necessary low voltage control and fiber optic cabling in unbroken/unspliced home runs from the Control Room to each display component.

2 See TD000 for a schedule of wire types to be used.

5 Equipment Racks:

1 Contractor to utilize existing racks onsite for all control equipment.

6 Structural Engineering

1 The display systems shall be designed, fabricated and installed by the Contractor in their entirety.

2 All necessary supporting structure, catwalks, stairways, access doors and access ladders (including fall arrest systems to code) are not part of The Contractor's scope of work.

3 For display systems that are to attach to facility structure, reference project drawings. The Contractor shall be responsible for field verification of existing conditions, submittal of shop drawings illustrating details of structural connection of display to facility structure, and submittal of structural calculations demonstrating compliance of display connection to facility structure to all building code structural requirements. Shop drawings and calculations shall be sealed and signed by a South Carolina licensed Structural Engineer retained by the Contractor.

4 Provide electrolytic protection between different adjoining metals.

7 Electrical

1 All power distribution from the feeder to a primary disconnect at the catwalk directly above the display to be provide by others.

2 The Owner will provide and connect circuits on each catwalk level to the LED cabinets.

8 Spares

1 Provide one spare 12 strand single mode fiber optic cable and one spare low voltage control cables between the Control Room equipment and the display.
2 Supply 2% spare parts of display module type.
3 Supply 1% spare parts of all data and signal distribution components.
4 Provide shelving for the storage of all spare equipment on the catwalk.

3. EXECUTION

1 GENERAL

1 Coordinate work with other trades to avoid causing delays in construction schedule.

2 Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place.

3 Cover edges of cable pass-through holes in enclosures, chassis, racks, boxes, etc., with rubber grommets or Brady GRNY nylon grommetting. Adhesive-backed electrical tape and friction tape is not acceptable for insulating or protective purposes.

4 Provide ventilation adequate to keep temperature within equipment racks below 85 degrees Fahrenheit. This ventilation system must be temperature actuated.

5 Provide a non-fluorescent service lamp in the top of each equipment rack.

6 Provide blank rack-mount panels installed in all rack openings not occupied by equipment. Blank filler panels will not exceed five rack units in size. Custom rack panels shall be 1/8 inch thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted.

7 Install rack mounted equipment with black 10-32 Phillips head machine screws.

8 Panels or equipment mounted on the rear rack rails must not block access to any front mounted components. Front mounted equipment will be given ample space to allow for access to rear connection.

2 CABLING

1 Exercise care in wiring; damaged cables or equipment shall not be accepted. Isolate cables of different signals or different levels; and separate, organize, and route to restrict channel crosstalk or feedback oscillation.

2 Wiring entering equipment racks and enclosures will be run directly to equipment. Use of splices or connectors to extend cabling to equipment will not be accepted.

3 Wiring and connections will be completely visible and labeled in equipment racks and enclosures.

4 Horizontally routed wiring to equipment will be managed with lacing bars and should include a service loop for future adjustments and terminations.

5 For equipment mounted on slides, additional service loops will be provided to accommodate the full range of travel of the slides.

6 Neatly bundle excess AC power cables from rack-mounted equipment with plastic cable ties. Rack wiring to be bundled with plastic cable ties or hook and loop tie wraps.

7 All cables in cable trays shall be neatly installed with maintaining separation of the different cable types.

8 Screw Connections: Only insulated crimp on spade terminals will be used for application to barrier strips. Multiple gang lugs or ring lugs are not acceptable for this purpose.
1 This is only applicable to stranded conductor wires. Solid conductors will be attached directly to the barrier strip.
2 All conductors will be stripped prior to installation underneath screws on terminals. Provide crimp lugs on stranded control cables, solid conductor wire will not require crimp lugs on individual conductors. All screw terminated solid conductors will be wrapped in the same direction as screw rotation during tightening.

9 Multiconductor Cables: Follow a uniform application of color codes for multiconductor cables throughout the Facility. Where there are unused conductors or pairs in a cable assembly, they can be insulated as a group, left long enough for future termination, and folded into the connector hood. Where this is impractical, they may be folded back along the outer jacket of the cable and covered with heat-shrinkable tubing.

3 LABELING

1 General
1 The attachment method for equipment identification plates will be designed for permanency unless otherwise described. All labels will be protected prior to installation, and will not be installed if damaged or scratched. Follow manufacturer's recommended procedure for surface preparation, which must be free of any dust, dirt or film.
2 On black lamicoid panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black.
3 Mount labels in a neat, plumb and permanent manner except where indicated.

2 Rack Labels
1 Provide engraved lamicoid labels with the Rack Number on the front of each rack in 1” high Arial text.

3 Panel Labels
1 Provide engraved labels for all terminations in 1/8” high Arial text.

4 Cable Labels
1 Cables and wiring to be logically, legibly and permanently labeled for easy identification.
2 Labels on cables to be adhesive strip type covered with clear heat-shrink tubing.
3 Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style label.
4 Hand-written or self-laminating type labels are not acceptable.
5 Wiring designations to be an alphanumeric code that is unique for each cable.
6 Locate the cable designation at the start and end of each cable run and within 2 inches of the point of termination or connection.
7 Actual cable designation assignments to be determined by Contractor.
8 Add cable designation codes to system schematic drawings included with Project Record Drawings.

4 TESTING

1 During all consultant walkthroughs, the Owner’s Representative will be present.

2 If during acceptance testing it becomes evident that further adjustment or work may be required to bring the system into compliance, the Contractor will continue to work until the system is acceptable at no additional charge over the contract price. If approval is delayed because of defective equipment, poor installation, or failure of equipment to meet the requirements of these specifications, the Contractor will pay for additional time and expenses of the Consultant at their standard rate in effect at that time, during any extension of the acceptance testing period. The

Contractor will provide rental or loaner equipment to make the system operational in critical cases of equipment failure prior to contract completion.

3 Make available three portable UHF business band radios for use during acceptance testing. Radios should have a transmission range sufficient to cover entire project. Radios to include rechargeable batteries and re-charger along with "holster" for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance. Confirm that radio frequencies used are not in use elsewhere on project site.

4 System Tests
- 1 The following procedures will be performed prior to testing of System:
  - 1 Control functions shall be checked for proper operation, from controlling devices to controlled devices.
  - 2 Adjust, balance, and align equipment for optimum quality including brightness, viewing angles, brightness uniformity, black level uniformity, color uniformity, hue uniformity, pixel mapping, scaling and resolution of video image to meet the manufacturer's published specifications.
  - 3 Allow for a continuous 48 hour period of "Burn In" running a looped test signal including equal intervals of Black, Green, Red, Blue and 100% White.
- 2 Display Power Down And Up Again:
  - 1 Display shall be adjusted to 6500K color temperature.
  - 2 Display shall be set at full brightness level with a standard 100 IRE white signal as its source. Screen will be allowed to stabilize and display controls shall be adjusted for a uniform brightness across the display.
  - 3 Both display and processing platform will be powered down together completely and then immediately powered up again.
  - 4 This procedure will be performed twice more in succession.
- 3 Uniformity At All Viewing Angles:
  - 1 Display shall be set at a brightness level appropriate for the facility. Screen will be allowed to stabilize and display controls shall be adjusted for a uniform brightness across the display.
  - 2 A signal generator will be used to generate each of the following colors for examination
    - 1 White (100 IRE)
    - 2 Black (7.5 IRE)
    - 3 Green
    - 4 Red
    - 5 Blue
    - 6 Cyan
    - 7 Magenta
  - 3 A "walk around" will be performed viewing the display at all possible angles of the display for each of the colors.
  - 4 Display (and overall processing) will be examined for module to module uniformity and pixel to pixel uniformity.
  - 5 Display will be measured using a spot photometer to verify manufacturer brightness and viewing angles.
- 4 High Contrast Image Performance:
  - 1 Display will be viewed in many lighting conditions.
  - 2 Display shall be set at a brightness level appropriate for each lighting condition. Screen will be allowed to stabilize and display controls shall be adjusted for a uniform brightness across the display.
  - 3 Display (and overall processing) will be examined for trueness of team colors, gama and contrast handling.
- 5 Control functions shall be checked for proper operation, from controlling devices to controlled devices.
- 6 Installed, loose and spare equipment shall be inventoried for correct quantity.

7 Any other test on any piece of equipment or system deemed appropriate by Consultant.
8 The omission of a description of a device, function, signal path, or test in this document shall not exempt the Contractor from responsibility for checking all devices and signal paths for appropriate compliance with Industry Performance Standards and making corrections necessary to bring system(s) into compliance with the applicable standards.

5 TEST EQUIPMENT

1 Make available the following equipment on site for final acceptance testing. Test equipment to be available for the entire period through final system acceptance. Prior to start of testing, submit a list to the Consultant of test equipment make and model numbers that will be used.
1 Megohmeter.
2 Multimeter: Measurement range, DC to 20,000 Hz, 100 mV to 300 V, 10 ma to 10A.
3 Spot Photometer.
4 CAT5E cable tester.

6 ACCEPTANCE

1 Preparation for Acceptance, prior to final inspection:
1 Temporary facilities and utilities shall be properly disconnected, removed and disposed of off-site.
2 All systems, equipment and devices shall be in full and proper adjustment and operation, and properly labeled and identified.
3 All materials shall be neat, clean and unmarred and parts securely attached.
4 All damage occurring to the facility, including broken glass, walls, doors, etc. shall be replaced or properly repaired and debris cleaned up and discarded.
5 All extra materials, portable equipment, and spares shall be delivered and stored at the premises as directed.

2 Submit a pre-commissioning systems report to the Owner and Consultant two weeks prior to the scheduled systems commissioning proving all systems to be in full compliance. Report shall include test results, date of each test, pertinent conditions such as control settings, etc., and test equipment employed. In addition, submit written notification that the installation has been completed in accordance with the requirements of this document, and is ready for acceptance testing.

3 Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing and supply required test equipment. Contractor will make available at least three technicians familiar with installation, available for the entire testing period (day and night), to assist in tests, adjustments, and final modifications. Tools and material required to make any necessary repairs, corrections, or adjustments will be submitted by the Contractor. The Contractor will keep a running list of all acceptance tests performed and submit a final copy of the results with the closeout submittals as listed in Part 1.6. Testing process is estimated to take 1 day up to 10 hours and may require multiple crews / shifts.

7 INSTRUCTION OF OWNER PERSONNEL

1 Upon completion of the installation of the specified display systems, and prior to any facility events, make available designated operating personnel training on the equipment operation. This training will be performed at the site by the Contractor’s and the manufacturer's education staff.

2 The System Reference Manuals must be complete and on-site prior to the time of the first instruction.

3 Make available trained personnel (two technicians) to be present during a minimum of five Owner designated events. More events may be added at no charge to the Owner if the system is not functioning appropriately.

4 Coordinate schedule of instruction with the Owner subject to availability of Owner's personnel. This may require scheduling instruction during weekends or evenings.

5 Training will be provided in a series of classes to operations personnel to review all aspects of operation and maintenance of the system. Follow-up sessions to better enhance the operator's ability to expand or maximize the system will be made available.

6 The system training will include one (1) day or 10 hours (10) hours of technical training covering the explanation of the system, including documentation, configuration, interfacing and diagnostics. Make available training of the system operators and maintenance personnel as follows:

1 System Overview: Explanation of system includes documentation, configuration, interfacing and basic diagnosis.

2 Operator Training: Training in the use of system devices including powering and general operation of overall systems.

3 Maintenance/Trouble Shooting: Advanced training in display and control system troubleshooting and maintenance. Manufacturer's representative will conduct scenario based training creating isolated system failures requiring owner to investigate and solve system failure problems as a means of gaining hands on knowledge of the systems.

END OF SECTION