

LOUISVILLE ARENA AUTHORITY – KFC YUM! CENTER

TECHNICAL SPECIFICATIONS: BROADCAST PRODUCTION UPGRADES

PROJECT NUMBER:
KFC20-1626

02.11.2021

PART 1 GENERAL

1.1 INTRODUCTION

- A. Louisville Arena Authority – KFC YUM! Center (hereinafter referred to as “the Owner”) intends to acquire a complete turnkey Video Production system. The Owner herewith requests proposals for the design, engineering, installation, commissioning, testing, and acceptance of the systems described in the attached specifications and forthcoming drawings for the interested persons (hereinafter known as “the Contractor”). Prices quoted shall be all-inclusive and represent complete installation at the site shown on the forthcoming drawings and in the attached specifications. The Contractor shall be responsible for all parts, labor, and all other associated apparatus necessary to completely install, test, and turn-over for acceptance to the Owner turnkey, fully operational system(s). These systems include, but are not limited to, the following:
1. Broadcast Control Room
 2. Technical Operation Center (TOC)
 3. Broadcast Cable Additions
 4. LED Front End Control

1.2 GENERAL DESCRIPTION

- A. The Contractor shall be responsible for providing all system(s) equipment as proposed by the Contractor.
- B. The Contractor shall be responsible for the provision and installation of all secondary structural steel (i.e. conduit supports and mounting structures) and mounting brackets/hardware required to accommodate the new system(s). This includes all labor, materials, equipment, tools, transportation, and project management required to complete a fully operational system(s) on the project.
- C. Contractor shall be responsible for assembly, secondary modifications (if necessary) and mounting of all system(s) components onto new or existing structures.
- D. Owner will provide Primary Power at defined demarcation points as shown on the project electrical drawings. Contractor shall be responsible for all power and electrical distribution from demarcation point (Secondary Power) to new system(s). Contractor shall provide all Secondary Power connections/terminations required to power new system(s).
- E. Owner will provide conduits or raceways as shown on the project electrical drawings for low voltage. All additional conduit and raceways required to complete a path to each network component shall be furnished and installed by Contractor. Contractor shall be responsible to furnish, install, and terminate all required cabling needed to make new system(s) complete and fully operational.
- F. Contractor is responsible for supplying a complete and fully operational system(s) as intended by the RFP documents and any subsequent addendums. Prior to entering into a contract for the project, Contractor is responsible for notifying Owner of any equipment omissions in the RFP documents that may prevent the completion of a fully operational system(s). If Contractor fails to notify Owner of any equipment omissions, Contractor shall assume responsibility for providing the required equipment at no additional cost to Owner.
- G. Contractor shall field verify all work site conditions prior to submitting shop drawings.
- H. Contractor shall grant Owner a license to use all proprietary software provided with this RFP for the life of the system(s).

- I. All equipment (except Owner Furnished (OFE)) and materials shall be new (latest version at time of bid) and shall conform to applicable UL, EIA, TIA, or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner. Evidence of unauthorized re-manufactured or "B" stock equipment on the project site will be deemed evidence of the Contractor's Failure to Perform the Work. Contractor shall take care during installation to prevent scratches, dents, chips or disfiguration.
- J. All equipment power circuits must have an emergency back-up system as deemed necessary per the local or state fire code; whichever is more restrictive

1.3 CONTRACTOR QUALIFICATIONS

- A. Owner seeks to contract with a Contractor for the full performance of the work as described in this RFP and have the option to obtain long-term service contract and support for all equipment supplied by the selected Contractor. In an effort to ensure the chosen Contractor has the long-term interests of Owner in mind, the following shall be required in order to submit a bid for this project. Failure to submit acceptable responses to all of these requirements shall eliminate a Contractor from consideration. The Owner, in its sole discretion, shall reserve the right to waive any or all of the requirements listed below.
- B. Contractor shall provide a list of a minimum of three (3) facilities (facility, contact name, title, address and current phone number) where the Contractor has provided equipment and services of equivalent size and scope within the last five (5) years.
- C. Contractor shall provide a minimum of one (1) facility (facility, contact name, title, address and current phone number) where the Contractor has provided equipment and services of equivalent size and scope that is at least five (5) years old.
- D. Contractor shall be required to provide a Letter of Surety from their bonding agent, stating their ability to provide a 100% payment and performance bond if they are the successful bidder.
- E. Contractor shall have a direct service employee or certified Contractor capable of providing maintenance response within 3 hours of a call for service.
- F. Contractor shall have a RCDD – Registered Communications Distribution Designer on staff.
- G. Contractor shall be a BICSI member.
- H. Contractor shall have a minimum of 5 years in the communications and structured cabling business.
- I. Contractor's primary line of business shall be communications and structured cabling.
- J. Contractor shall have a minimum of 10 full-time installers.

1.4 SUBMITTAL REQUIREMENTS

- A. Contractor shall be required to provide submittals and shop drawings (print and electronic) to Owner within twenty (20) calendar days of date shown on award notice, acknowledged with a binding letter of intent. Contractor shall be responsible to ensure that the dimensions and specifications of each component and all systems fit within the building allowances. Contractor shall advise the Owner of any discrepancy that may affect installation. If Contractor fails to notify Owner of any discrepancies, Contractor shall assume responsibility for providing the required equipment or correcting such discrepancies at no additional cost to Owner. The following required submittals will be defined by guidelines established by the Owner and shall include but not be limited to:
 - 1. Three (1) sets of electronic shop drawings in PDF format, and predictive analysis studies (DWG and PDF) product data and samples together in one package within twenty (20) calendar days of date shown on Award Notice to Contract and prior to ordering equipment.
 - 2. Catalog data sheets, neatly bound with title page, space for submittal stamps, and tabbed dividers between Sections. Provide a complete list of proposed equipment with reference to its

corresponding specification paragraph number or equipment title in specification paragraph order. Denote all approved substitutions.

3. Point-to-point wiring diagrams and typed wire lists identifying every connection. Include electronic devices such as switches, transformers and terminal blocks. Indicate locations of all components. Identify cables by types, colors and wire numbers. Complete, detailed wiring diagrams for the systems, based on the contract documents but including cable types, identification and color codes, and detailed wiring of connections, both at equipment and between equipment racks and wiring conduit, connector types, expansion loops and cable lengths. Drawings shall comply with ANSI and International Electro technical Commission recommendations and standards as appropriate. Provide drawing set cover sheet clearly dimensioning all cable preparation details for each cable type and connector utilized in the system.
4. Structural engineered drawings (if required) for all secondary steel framing required for this scope of work. Structural drawings submitted shall include attachments to primary steel structure. Structural engineered drawings shall also include method of attachment for all components required for this scope of work. A licensed/registered engineer in the state where this project is located shall stamp all structural drawings.
5. Conduit riser diagrams showing required conduits and junction boxes along with types of quantities of cables to be contained in each conduit. Show details of weatherproofing, lightning protection and grounding, strain relief and cable support, fire stop protection, and wall penetrations through all rated partitions.
6. Rack elevations indicating the proposed arrangement of mounted equipment including power junction box location and locations of conduit penetrations. Rack elevations shall include front and rear views. BTU loads for each piece of equipment shall also be included on the rack elevation drawing.
7. Detail drawings of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.
8. Proposed color selections and finishes for all exposed surfaces and custom fabricated items. Submit actual color/finish samples, wall plates, and custom labels.
9. A list of all lower tier subcontractors and suppliers. List shall include lower tier subcontractor's qualifications indicating performance of similar work on past projects of this type and scope.
10. A project schedule in Gantt chart format outlining equipment delivery dates and installation start and finish dates. Project schedule shall be broken down into sufficient detail (work task and duration) to permit Owner to monitor installation progress on a daily basis.
11. Copies of all required business and Contractor licenses.
12. Copies of proof of insurance.
13. Approval of submitted items indicates only the acceptance of the manufacturer and quality. Specific requirements, arrangements, and quantities shall comply with the intent of the Contract Documents as interpreted by the Owner unless specifically approved in writing.
14. Submittals that are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors will be returned without review for rework and re-submittal, and may result in back charges to the Contractor.

1.5 CONTRACT CLOSEOUT SUBMITTAL

- A. When the installation is substantially complete including the Testing Reports in Part 3 of this Section, Contractor shall submit two (2) complete initial hard copy sets of contract closeout submittals to the Owner for review. After review and approval of initial set, Owner shall return one (1) initial hard copy to Contractor with comments for updating. Contractor shall provide four (4) final sets of closeout submittals to Owner and one (1) electronic copy in PDF format, or format related to discipline. Closeout submittals shall include, but not be limited to:
 1. Project Record Drawings (As-Built Drawings) including final secondary steel structural drawings, electrical drawings, systems block diagrams, rack elevation drawings and wiring schedule.
 2. As built configuration files.

3. An Operation & Maintenance Manual.
4. A list of all equipment provided and its location within the facility. List shall include manufacturer name, model identifier, serial number, and any other pertinent information needed to obtain service, maintenance, and/or replacement.
5. A list of all Subcontractors who performed work for Contractor during installation. List shall include company name, physical company address, phone number, and contact person(s).
6. Copies of all software, settings and programs used in the control and operation of this system.
7. Copies of all equipment registration documentation.
8. Test reports for all new copper and fiber optic cable installed under this scope of work. Test reports shall indicate end to end signal loss does not exceed applicable industry standards.

1.6 OPERATION & MAINTENANCE MANUAL

- A. Upon substantial completion but prior to onsite training with the Owner, Contractor shall provide two (2) print final Operation & Maintenance Manuals (O&M Manuals) and one electronic PDF copy. O&M Manuals shall have tab dividers and shall be logically organized to provide easy access to information without the need to research through entire manual. All documents provided in the O&M Manual shall be written in English and shall provide sufficient detail as to be understood by an individual with knowledge of the provided systems. Contents of the O&M Manual shall include, but not be limited to:
 1. Table of Contents.
 2. Description / overview of system(s) including key features and operational procedures.
 3. Full start up procedure for all systems equipment and any additional networking components written under the assumption that all equipment was in full powered off mode.
 4. Full shutdown procedure for all systems equipment written under the assumption that the facility is in an extended power failure situation.
 5. Owner's Manuals for all third party and/or "off the shelf" type equipment provided by Contractor, e.g., KVM's, fiber modems, network switches/routers, and UPS battery backups.
 6. Small scale plans showing locations and circuit numbers for all system outlets and receptacles.
 7. Single-line block diagrams showing all major components of the systems.
 8. All third-party equipment and/or "off the shelf" equipment warranties and a notarized System Warranty.

1.7 EQUIPMENT GENERAL SPECIFICATIONS

- A. All equipment and materials, except owner furnished, shall be new and the latest version at the time of bid and shall conform to applicable UL, ULC, CSA or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner. Evidence of unauthorized re-manufactured or "B" stock equipment on the project site will be deemed evidence of the Contractor's failure to perform the work. Contractor shall take care during installation to prevent scratches, dents, chips or disfiguration of equipment and materials supplied. All damaged equipment and/or materials shall be repaired or replaced at Owner's discretion. Contractor shall perform either option selected by Owner at no additional cost to the Owner.
- B. All cabling [power and data] is to be labeled at each end of the cable with a description in English OR with a reference to a wire designation on a wiring diagram. These diagrams must be part of the Project documentation submitted to the Owner at time of acceptance.
- C. Each device shall meet all of its published manufacturer's specifications. Verify performance as required.

- D. Provide, at a minimum, one uninterruptable networked managed power supply (UPS) at the bottom of each rack supplied by Contractor. UPS shall have the capability of providing power to all equipment within the rack for a period of 15 minutes in the event of a power failure at the facility.
- E. Install all rack mounted equipment with Middle Atlantic Products HP Series truss head screws or approved equal.
- F. Some rack-mounted equipment may require shaft locks, security covers, or removal of knobs; provide and install during Acceptance Testing.
- G. Networking enclosures exposed to the outdoors, will be of a NEMA 4X rating or better and provide adequate environmental control to ensure long-term equipment operation.
- H. Provide engraved self-adhesive Lamicoïd labels at the front and rear of all rack-mounted signal processing equipment. Mount labels on the equipment chassis and attach in a neat and permanent manner. Embossed label will not be accepted. Label equipment with schematic enumeration reference, and with descriptive information regarding its function or area it is serving. Similarly, provide engraved labels at the rear only of equipment mounted in furniture consoles.
- I. Mounting Hardware exposed to the weather shall be aluminum, brass epoxy painted galvanized steel or stainless steel. Apply corrosion inhibitor to all threaded fittings.
- J. Equipment Racks shall be Middle Atlantic Products model MRK-4436, or approved equal, with accessories as noted below. Quantity of racks shall be as required to house all equipment supplied under this scope of work. Any unused rack mounting spaces shall have ventilated (~64%) blank panels to fully enclose the rack assembly. Multiple racks shall be anchored together using appropriate ganging hardware. Standard solid rear door shall be replaced with Middle Atlantic Products model MW-VRD-44 vented rear door.
 - 1. Provide two (2) side panels per individual stand-alone rack or series of racks ganged together. The intent is to have an enclosed rack system. A single stand-alone rack shall have two (2) side panels and a series of three (3) racks ganged together shall also have two (2) side panels. Side panels shall be Middle Atlantic Products model SPN-44-36 or approved equal.
 - 2. Provide Middle Atlantic Products model MW-4QFT-FC integrated fan top, or approved equal, for each rack. Fan shall be thermostatically controlled to ensure in-rack temperatures of less than 68 degrees Fahrenheit.
 - 3. Provide two (2) Middle Atlantic Products model LT-GN-PL gooseneck work lights, or equivalent, for each rack required for this scope of work.
 - 4. Provide Middle Atlantic Products model PDT-2X1020T, or approved equal, in rack vertical power strip. Power strip shall have enough receptacles to accommodate all equipment housed in the associated rack with a minimum of two spare receptacles per rack.
- K. Any rear mounted rack equipment shall be placed so the equipment does not block access to the back of front mounted equipment.
- L. Contractor shall exercise care when wiring racks to avoid damaging cables and equipment. Contractor shall install grommets around cut-outs and knockouts where conduit or chase nipples are not installed.
- M. Equipment Racks shall have a ground buss installed in each rack. Ground buss shall be insulated from the rack. Attach equipment rack to ground buss at one point using #4 insulated copper wire. Ground any equipment chassis without a three-conductor power cord directly to the buss bar using #12 insulated copper wire. Tie each and every power receptacle ground contact to the buss bar using #12 insulated copper wire. Interconnect signal cables shall be routed from junction boxes through metallic flexible conduit(s) (2.5 cm to 5 cm diameter) as appropriate. Flexible conduit shall be insulated from racks by approved insulating bushings.

- N. Power wiring and signal/data wiring shall be installed on opposite sides of rack. Contractor may determine which side is used for power and which side for signal. Method shall be kept the same for entire installation, if multiple racks are required. Contractor shall exercise care when wiring racks to avoid damaging cables and equipment.
- O. Equipment installed in exterior locations shall be IP67 rated and operating temperature range 0 degrees F to 90 degrees F and survivable from -20 degrees F to 110 degrees F.
- P. Any equipment mounted above seating areas and venue floor is required to be secondarily fastened to structure using aircraft cable and appropriate fasteners. Cable sizing and fasteners to be capable of supporting a minimum of two (2) times the weight of the affixed device.

1.8 QUALITY ASSURANCE

- A. All requirements of the latest published editions of the following standards shall apply, unless otherwise noted. In the event of conflict between cited or referenced standards, the more stringent shall govern.
 - 1. National Electric Code (NEC Code)
 - 2. National Electrical Manufacturers Association (NEMA)
 - 3. Occupational Safety and Health Administration (OSHA)
 - 4. Underwriters Laboratories (UL)
 - 5. Electronic Industries Association (E.I.A.)
 - 6. Telecommunications Industries Association (T.I.A.)
- B. Review all architectural, civil, structural, mechanical, electrical, and other project documents relative to this work.
- C. Verify all dimensions and site conditions prior to starting work.
- D. Coordinate the specified work with all other trades.
- E. Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner during the entire installation. Change of supervisor during the project shall not be permitted without prior written approval from the Owner.
- F. Provide all items not indicated on the drawings or mentioned in the specifications that are necessary, required or appropriate for this work to realize a complete and fully operational system that performs in stable and safe manner.
- G. Review project documentation and continuously make known any conflicts discovered and provide all items necessary to complete this work to the satisfaction of the Owner without additional expense. In all cases where a device or item or equipment is referred to in singular number or without quantity, each such reference shall apply to as many such devices or items as are required to complete the work.
- H. Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Owner, without additional cost to the Owner.
- I. Regularly examine all construction, and the work of others, which may affect Contractors work to ensure proper conditions exist at site for the equipment and devices before their manufacture, fabrication or installation.
- J. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.

- K. Promptly notify the Owner in writing of any difficulties that may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable in all ways to receive this work, except for defects that may develop in the work of others after its execution.
- L. After installation, submit photographs showing cable entries and terminations within equipment racks, enclosures and pedestals at the job site.

1.9 APPLICABLE STANDARDS

- A. The following standards are applicable to this document and must be adhered to for any installation work performed.
 - 1. TIA/EIA 568-B: Commercial Building Telecommunications Cabling Standard.
 - 2. TIA/EIA TSB-67: Transmission Performance Specifications for UTP Cabling.
 - 3. TIA/EIA 568-A-1: Propagation Delay and Delay Skew for 100 Ohm 4-pair Cable.
 - 4. TIA/EIA 568-B.2.1: Category 6 Final Draft.
 - 5. TIA/EIA-569-A: Commercial Building Standard for Pathways and Spaces.
 - 6. TIA/EIA-606: Administration Standard for Commercial Buildings.
 - 7. TIA/EIA-607: Commercial Building Grounding/Bonding Requirements.
 - 8. ANSI/NFPA-70: National Electrical Code.
 - 9. ANSI/IEEE C-2: National Electrical Safety Code.
 - 10. Pertinent Local Codes and Standards

1.10 HIGHLIGHT REQUIREMENTS

- A. All UTP cables installed:
 - 1. Shall not exceed 1cm untwist at termination.
 - 2. Shall not exceed 2cm jacket removal at termination.
 - 3. Shall maintain 2.5cm minimum bend radius at all times
 - 4. Shall not be stepped-on, kinked, or otherwise disfigured during installation.
 - 5. Shall be installed, wherever possible, 60cm from sources of EMI such as fluorescent lamps, electrical cables and conduits; when this is impossible, maintain as much separation as possible.
 - 6. Shall not be laid directly onto suspended ceiling grid.
 - 7. UTP cable maintenance loops shall be a minimum of 1 meter at the work area outlet and 3 meters at the wiring closet.
 - 8. Do not over-tighten cable ties (shall be able to move 25.4 mm either direction without significant force).
 - 9. All wiring shall be installed in a star-topology, i.e., one individual 4-pair cable per jack.
 - 10. All 4-pair of each UTP cable shall be terminated onto a single jack or patch panel port; splitting pairs (i.e., 2 pair for voice, 2 pair for data) shall not be allowed.
 - 11. All cable runs in ceiling areas shall be supported with 25.4 cm bend radius compliant supports every 1.5 meters; cable ties to ceiling grid wire shall not be used as a ceiling support facility.
 - 12. All conduit sleeves and slots shall have fire stop with appropriate fire-rated materials according to local regulations and local fire codes.
 - 13. Contractor shall be cognizant of any areas requiring low smoke, zero halogen cabling and institute appropriate products where required.

END OF PART 1 GENERAL

PART 2 PRODUCTS

2.1 VIDEO REPLAY / TOC

- A. For the Control Room and Broadcast Cable, please see the Bid Form for a complete equipment list anticipated with this scope.
- B. For the LED Front End, this project will be bid with systems from (3) different manufactures. Please work with all three manufactures to supply pricing for the different system. There is a LED Front End section in the control room portion of the bid form to indicate the cost of each system.
 - 1. Acceptable Manufactures
 - a. ChyronHego
 - b. Ross Video Tessaera
 - c. Daktronics Show Control

END OF PART 2 PRODUCTS

PART 3 EXECUTION

3.1 SCOPE OF WORK

- A. The following outlines the turnkey delivery and installation responsibilities that define the project scope of work. Any and all work outlined in this section is the responsibility of the Contractor unless otherwise noted. Any and all dates referenced in this document are approximate projected dates and are subject to change.
- B. Provide and install all equipment listed in Part 2 – Products, including all equipment not specifically listed that is required to provide a completely functional system.
- C. All equipment listed in Part 2 should be considered the base bid. All alternative equipment will be considered if it meets the same specs as the base system. Please provide cut sheets for any alternative equipment you are presenting.
- D. Final connection locations will be coordinated with the Project.
- E. Cable tray paths to be used when available.
- F. It is the responsibility of the SI to coordinate with the project and run a pair of program lines to the input of the video processor provided by the LED manufacture. The LED processors are located in the TOC.
- G. Integration Requirements:
 - 1. All pigtails will be fusion spliced with “ST” connector
 - 2. Mechanical splices are not permitted
 - 3. Splices will be dressed into the LIU and connected to I/O plate
 - 4. All terminated connections will be labeled in the LIU
 - 5. All terminated connections will be tested and documented
 - 6. All testing results will be submitted to the consultant and owner in soft form
 - 7. Any fiber not able to be certified will need to be tested with an OTDR, it will be the responsibility of the systems integrator to correct at no cost to the owner. Trace of test to be provided to consultant and owner.
 - 8. Provide required signal and data cable. Connect all equipment with power, signal and control wiring from electrical outlets currently existing or to be provided
 - 9. Provide required video, audio, fiber and data cable: connect all equipment with power, signal and control wiring
 - 10. Ensure that levels and impedances are properly matched between components
 - 11. Provide all required permits and licenses
 - 12. Provide on-site installation supervisor per Section 1.5.E
 - 13. Coordinate work with other trades and coordinate scheduling with the construction supervisor to minimize delays
 - 14. Deliver all Equipment to site and convey to appropriate locations within site as directed by the project
 - 15. Store all Equipment in a safe and secure manner until installed, or as otherwise directed by the project
 - 16. The solution shall broadcast 1080P HDR output video

17. The solution shall enable live triggers MOE from production and board show, (e.g. goal being scored).

3.2 LED FRONT END

A. Project Scope

1. Provide a fully functional operating system capable of CG, exposure time tracking, and game operation. Systems must be capable of playing back industry standard still and animation file formats. It is understood that different operating control systems have preferred file formats. File conversion is acceptable.
2. The system must have the ability to support DVE moves, enabling dynamic switching between full screen and vectored views with areas for sponsor ads, statistics, and game in progress data for the scoring system.
3. The system must be capable of accepting a serial feed from the scoring controller and any and all 3rd party stats, sport ticker feeds, social media feeds and closed captioning as required.
4. Image playback is to be stutter-free for both static and animated graphics.
5. Contractor is responsible for providing all required components and wiring necessary to manage and control the LED display from a location outside of the display housing. Rack are owner furnished.
6. System architecture must allow for 100% processing and control redundancy. Back up units shall be installed in the equipment racks and shall be hot swappable.
7. Provide 20 custom animations with a minimum of 50% 3-D animations for each of the LED displays.

B. LED Assets

1. Center Hung Sideline Displays
 - a. Pixel Pitch: 4mm
 - b. QTY: 2
 - c. Pixel Matrix: 1,664H x 3,232L
2. Center Hung Endzone Displays
 - a. Pixel Pitch: 4mm
 - b. QTY: 2
 - c. Pixel Matrix: 1,664H x 1,920L
3. Center Hung Underbelly Displays
 - a. Pixel Pitch: 2.5mm
 - b. QTY: 2
 - c. Pixel Matrix: 1,104H x 4,640L
4. Suspended Corner Displays
 - a. Pixel Pitch: 6mm
 - b. QTY: 4
 - c. Pixel Matrix: 480H x 2,880L
5. Upper Level Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 1
 - c. Pixel Matrix: 96H x 29,760L

- d. The length is (8) sections of various heights
- 6. Club Sideline Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 2
 - c. Pixel Matrix: 96H x 8,224L
- 7. Endzone Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 2
 - c. Pixel Matrix: 96H x 5,664L
- 8. Event Level Corner Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 4
 - c. Pixel Matrix: 96H x 512L
- 9. Upper Vomitory Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 30
 - c. Pixel Matrix: 96H x 288L
- 10. Lower Vomitory Ribbon Displays
 - a. Pixel Pitch: 10mm
 - b. QTY: 8
 - c. Pixel Matrix: 96H x 128L
- 11. Exterior Marquee Display
 - a. Pixel Pitch: 10mm
 - b. QTY: 1
 - c. Pixel Matrix: 640H x 960L

3.3 WARRANTIES, MAINTENANCE AND LICENSES

- A. Contractor shall warrant labor and materials for twenty-four (24) months following the date of Final Acceptance, inclusive of all hardware and software licensing.
- B. During the warranty period the system shall be free of defects and deficiencies and conform to the drawings and specifications with respect to the quality, function, and characteristics stated.
- C. Contractor shall repair or replace defects that occur in labor or materials within the warranty period.
- D. On-site labor shall be included during the warranty period for any work beyond simple component replacement. Simple component replacement shall be defined as all equipment that does not require tools to perform the equipment replacement.
- E. Failed parts shall be returned to the Contractor for repair at a service facility located in the United States. Contractor shall identify the location of its service facility in the documentation provided when submitting a bid for this work.
- F. The Contractor shall replace failed parts that cannot be repaired.

- G. Upon receipt of a failed part, Contractor shall return a repaired or replacement part to the Owner within fifteen (15) business days from receipt of failed part.
- H. Contractor shall supply at least one local service employee or local authorized service agent for service and repair of all equipment during the warranty period. Local service employee or local authorized service agent shall be located within 75 miles of Owner's facility.
- I. The local service employee or local authorized service agent shall be the entity responsible for providing the following emergency response availability:
- J. Telephone service assistance and technical support from 8am to 11pm local time at Owner's facility, 7-days per week.
- K. Answer all service calls and requests for information within one (1) hour during the warranty period.
- L. The advance replacement should contain all of the shipping information and packaging necessary to return the defective part or assembly back to Contractor at no cost to the Owner.
- M. Warranty shall cover all equipment, including processors, controllers, operating systems, and software.
- N. Warranty shall include two annual on-site system check-ups by a qualified technician who is a full-time employee of the Contractor. Visit to occur within 30 days of the second and third anniversary of the projects final completion as determined by Owner.
- O. Check-up shall include all regular maintenance; including filter cleaning, a complete inspection of all systems, parts replacement where required and a complete written report of all findings.

3.4 WIRING PRACTICES

- A. Where specific instructions are not given, perform all wiring in strict adherence to standard systems engineering practices in accordance with the references listed.
- B. Group all wiring into the following classifications by power level or signal type:
 - 1. Microphone Level
 - 2. Line Level Audio and DC Control Circuits
 - 3. Video Level
 - 4. Copper Data
 - 5. Fiber Data
 - 6. AC Power Circuits
- C. Separate wiring of differing classifications by at least fifteen (15) cm, wherever possible. Wherever lines of differing classification must come closer together than fifteen (15) cm, cross them perpendicular to each other.
- D. Neatly harness wires together within racks by power level classification using horizontal and vertical wiring supports as required. Rigidly support all wires with fixed connection points. Leave service loops of sufficient lengths to allow rack hinges or slides to fully extend to facilitate access to rear panel connectors from the front of each rack. Do not use self-adhesive ty-wrap pads for support of cables unless fastened with screws.
- E. Exercise care in wiring to avoid damaging the cables and equipment. Use grommets around cut-outs and knockouts where conduit or chase nipples are not installed.
- F. All fiber splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be .05 db.

- G. Pull mandrel one size smaller than the conduit, through entire length of all underground conduits.
- H. Cable pulling lubrication shall be utilized when pulling cable in conduits.
- I. A dynamometer shall be used to measure pulling tension during long or difficult runs. The dynamometer is to be placed between the cable puller and the pull line to monitor pulling tension. The manufacturer's pulling tension maximum range shall not be exceeded.
- J. Pulling grips suitable for use with fiber cables shall be applied to the ends of the cable. Consult cable manufacturer to determine appropriate pulling grip and method of attachment. Breakaway or fuse links shall be used at the pulling grip. Ensure that the correct fuse pin is installed in the fuse link.
- K. The bend radius for all cables shall conform to manufacturer's specifications.

3.5 LABELING

- A. Label products in a logical, legible, and permanent manner corresponding to the Drawings. Wording, format, style, color and arrangement of text will be subject to the Owner's approval. Submit samples and labeling schedule for approval. Labeling will be verified at final system commissioning.
- B. Label all wall plates, as well as, connector mounting plates in all boxes using 1/8" engraved lettering filled with black or contrasting paint, as approved.
- C. Use engraved plastic labels similar to Lamicoid, squarely and permanently attached, to label the following:
 - 1. Patch panel designation strips.
 - 2. LIU designation strips.
 - 3. Access points.
 - 4. Front and back of all rack mounted equipment including controls.
 - 5. Barrier strips, terminals, transformers, switches, relays and similar devices.
- D. Label all permanently installed wires on both ends with approved permanent clip-on type or sleeve type markers. Wrap-around adhesive labels will not be accepted unless completely covered with clear heat shrink tubing.
- E. Label all portable equipment with engraved block letters using initials and/or words. Label all portable cables similarly with printed heat-shrinkable tags located 30 centimeters from the male connector end. Verify lettering through the Owner prior to engraving or printing.
- F. Label access panels and backboards with designations corresponding to the drawings. Where devices are concealed above access ceilings, provide permanent Lamicoid labels, on the ceiling « tees », corresponding to the drawings in finishes and sizes approved by the Owner.

3.6 HORIZONTAL CABLE SUBSYSTEMS

- A. Where connectors must be installed into surface mounted raceway, the Contractor shall provide the appropriate faceplate as well as any necessary adapters to facilitate the installation of the connectors specified in this section directly into the raceway. Surface mounted boxes shall not be accepted as mounting devices on surface raceways.
- B. At the wiring closet, each UTP cable shall be terminated onto an approved connector and loaded into an approved modular patch panel or equivalents. All patch panels shall be modular, front-access, high density patch panels. No fixed-port 110-style panels shall be accepted. Contractor shall provide required patch panels ports plus 20 percent for future growth. Patch panel ports provided as excess for future growth need not be populated with connectors. However, all excess ports not populated shall have installed a single blank insert.

- C. A two-rack-space horizontal wire management panels shall be installed for every 48-port patch panel. All wire management panels shall be made of flexible finger-duct with covers. D-ring wire management systems shall not be accepted.

3.7 BONDING AND GROUNDING

- A. All cabling, racks, and patch panels shall be bonded and grounded in accordance with TIA 942.
- B. All fiber optic cables shall be tested the final draft of the TIA/EIA applicable standard with a Fluke, OptiFiber Pro OTDR or equivalent, tester and meet or exceed the performance criteria. Test reports evidencing these performance levels shall be provided for each cable link. Test results shall be provided in hard copy and electronic format to the Owner upon completion of the project.
- C. All cables, outlets, and patch panel ports shall be labeled in accordance with the TIA/EIA 607 Administration Standard for Commercial Buildings using a Panduit LS7 hand-held labeler or Panduit PanMark software or equivalent. No hand-written labels shall be accepted.

3.8 ELECTRICAL AND DATA WIRING

- A. The electrical design and installation of all branch circuits by the Contractor shall comply with NEC, State and local codes, as well as Owner regulations and guidelines.
- B. The Contractor shall provide separate single-line diagrams for each type of signal.
- C. Electrical design and engineering must be reviewed and approved by the Owner prior to any electrical work by the Contractor.
- D. The Contractor will be responsible for power distribution from the demarcation points noted on the included electrical drawings. Any additional electrical components required for a complete and fully operational system but not shown on the electrical drawings shall be the responsibility of the Contractor.
- E. Any additional raceway (conduit, cable tray, J hooks) required to provide a complete system for both power and signal/data shall be furnished and installed by Contractor. Any additional raceway required shall have routing of raceway approved by Owner prior to installation.
- F. The Contractor shall be responsible for termination and final connection of power to all elements. All secondary electrical panels must be clearly marked with names of the branch circuits controlled by each breaker to aid in troubleshooting or isolating problems. All electrical services, disconnects, and breaker panels are to be labeled with what they control and where they are fed from.
- G. Contractor shall not use wire nuts or electrical tape for any power or signal connection or any part of the work. All connections shall use a proper terminal block and spade terminal, or terminal block and direct connection as required. Covers shall be provided over-all high-power terminal blocks to prevent electrical shock.
- H. Any equipment not certified as required shall require on site certification by a listed testing agency. All cost associated with obtaining on site certification shall be the responsibility of the Contractor. Written proof of certification or equivalent will be required prior to any work being performed on site.
- I. Contractor to provide all required fiber transmitters and receivers. Contractor will be responsible to terminate and perform final connection of all cables.

3.9 AESTHETIC CONSIDERATIONS

- A. At the time of the release of this RFP the Owner is still developing certain finishes and aesthetic design elements for consideration. Contractor shall assume premium finishes on all elements not yet defined.

- B. Post contract award, the Contractor must provide a comprehensive outline of intended finish details of all system equipment that is to be located in public viewing areas for Owner approval. Failure to submit these details shall make Contractor responsible for all finishes as required by Owner at no additional cost to Owner.
- C. The Contractor shall not visibly display its trademarks or insignia on any of the Equipment or structural elements within public view. Unless explicitly negotiated with the Owner.

3.10 FINAL ADJUSTMENT AND COMMISSIONING

- A. Schedule a time for the Owner and Contractor to perform the Final Adjustment and Commissioning. Notify the Owner at least seven (7) days in advance.
- B. Furnish engineers who are familiar with the system to assist the Contractor during the Final Adjustment and Commissioning.
- C. Record final settings on all equipment and submit with contract closeout documents.

3.11 TRAINING

- A. The Contractor, at its own expense, will provide designated Owner representatives operator and maintenance training.
- B. Training will be performed at the site by a qualified technician and shall occur either during installation of the equipment or immediately thereafter.
- C. The training shall cover the operation, routine maintenance and troubleshooting of systems equipment.
- D. Warranty period will commence at conclusion of the third consecutive successful event

3.12 TESTING AND ACCEPTANCE

- A. Contractor must demonstrate the full capabilities of the provided systems and prove performance meets contractual specifications.
- B. Confirmation will be required of, but not limited to, the following functions: operation of each system component, including back-up systems, control functionality and integration with existing systems.
- C. Contractor must provide all necessary testing equipment for acceptance.
- D. Upon notice from the Contractor of substantial completion and at a time to be mutually agreed upon, the Contractor will arrange for the testing of all operations of the systems comprised in scope of work at the time of substantial completion.
- E. The following items must be completed and signed off by an appropriate Owner's official before the Owner will deem the system "Accepted":
 - 1. Three Completed events with no equipment or system failures.
 - 2. The Owner will not be responsible for any added costs as a result of an unsuccessful acceptance test.
 - 3. Acceptance of the system includes, but is not limited to, the completed installation of all physical components as well as proper system functionality. Tests of the system shall not occur until after the system has been installed, and all work completed.
- F. Document all acceptance testing, calibration and correction procedures described herein. Include the following information:
 - 1. Performance date of the given procedure.

2. Condition of performance of procedure.
 3. Type of procedure, and description.
 4. Parameters measured and their values, including values measured prior to calibration or correction, as applicable.
 5. The names of personnel conducting the procedure.
 6. The equipment used to conduct the procedure.
- G. Upon completion of initial tests and adjustments, submit written report of tests to the Owner along with all documents, diagrams, and recorded drawings required herein.
- H. Final Procedures
1. Perform any and all "punch-list" work to correct inadequate performance or unacceptable conditions, as determined by the Owner, at no additional expense to the Owner.
 2. Furnish all portable equipment to the Owner along with complete inventory documentation. All portable equipment shall be presented in the original manufacturers packing, complete with all included instructions, miscellaneous manuals, and additional documents.
 3. Provide new acceptance testing in the same format as initial test reports.
 4. Check, inspect, and if necessary, adjust all systems, equipment, devices, and components specified, at the Owner's convenience, approximately thirty (30) days after the Owner's acceptance.
 5. Upon completion of the Work, the Owner may elect to verify test data as part of acceptance procedure. Provide personnel and equipment, at the convenience of the Owner, to reasonably demonstrate system performance and to assist with such tests without additional cost to the Owner.

END OF PART 3 EXECUTION