

LOUISVILLE ARENA AUTHORITY – KFC YUM! CENTER
PERFORMANCE SPECIFICATIONS: CELLULAR DAS WITH WI-FI
OPTION.

PROJECT NUMBER:
KFC20-1626

03.08.2022

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 Cellular DAS. The Owner herewith requests proposals for the provision, installation, commissioning, testing, acceptance, and warranty 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. Cellular DAS – 5G forward compatible.
 - a. Option for Private LTE
 - b. Option for full venue High-Density Wi-Fi
- B. The Arena currently has a functioning Cellular DAS solution. It is a ExteNet 3PO revenue share solution. It is expected that the new engagement will be of the same type of business model. The Arena is also interested in the option of high-density Wi-Fi as an optional provision.
- C. The awarded Contractor will build the DAS solution at-risk regardless of Carrier adoption contracts. This is a high-traffic, high-visibility venue with all major Carriers currently represented. There is no reason to assume adoption will be problematic.
- D. The high-density Wi-Fi option, if selected maintains an alternate timeline that is more aggressive than the DAS timeline. Be cognizant of these requirements if elected.

1.2 GENERAL DESCRIPTION

- A. The Contractor is responsible for provision and installation of all cellular and Wi-Fi (if elected) equipment as defined in the Bid Specification and Design Drawing documents, and all system equipment 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), rigging components, and mounting hardware required to accommodate the new system devices. This includes all labor, materials, equipment, lifts, tools, transportation, and project management required to complete a fully operational system as specified for this project.
- C. Contractor shall be responsible for assembly, secondary modifications (if necessary) and mounting of all system components onto new or existing structures.
- D. Owner will provide Primary Power at defined demarcation points. Contractor shall be responsible for all power and electrical distribution from demarcation points (Secondary Power) to new system(s). Contractor shall provide all Secondary Power connections/terminations required to power new system devices.
- E. Existing low voltage conduits and/or raceways may be used where available and within code. All additional conduit and raceways required to complete a path to each component shall be furnished and installed by Contractor. Contractor shall be responsible to furnish, install, and terminate all required cabling required for a complete and fully operational system as specified.

- F. Contractor is responsible for supplying a complete and fully operational system as intended and specified within the RFP design 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. If Contractor fails to notify Owner of any equipment omissions, Contractor will assume responsibility for providing the required equipment at no additional cost to the 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. To ensure the chosen Contractor has the long-term interests of Owner in mind, the following shall be required to submit a bid for this project. Failure to submit acceptable responses to all requirements shall eliminate a Contractor from consideration. The Owner, in its sole discretion, shall reserve the right to waive any or all 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 at least one CTS-I – Avixa 'Certified Technology Specialist – Installation' on staff.
- G. Contractor shall have a minimum of 10 full-time installation technicians with Avixa CTS certifications.
- H. Contractor shall have a minimum of 5 years in the professional integration industry.
- I. Contractor's primary line of business shall be professional systems installation.

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. One (1) set 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 and wire numbers. Complete, detailed wiring diagrams for the systems based on the contract documents including cable types, identification, 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 for all rigging and 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 structural engineer licensed and registered in the state where this project is located shall stamp all structural drawings prior to acceptance of shop drawing submission.
 5. Conduit riser diagrams showing required conduits and junction boxes along with types and quantities of cables contained within 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. Custom fabricated items associated with rigging and suspended components shall be stamped by a structural engineer licensed and registered in the state where this project is located.
 8. Proposed color selections and finishes for all exposed surfaces and custom fabricated items shall be submitted to and approved by the Owner prior to acquisition and installation. Submit actual color/finish samples, wall plates, and custom labels.
 9. Provide 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 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 designated equipment rack used by the 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 Lamicoid 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 MPR series, or approved equal, in rack modular 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. 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.
- N. 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.
- O. 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 a 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. NFPA 70 - National Electrical Code
 - 2. American National Standards Institute (ANSI)
 - 3. Institute of Electrical and Electronic Engineers (IEEE)
 - 4. ANSI/IEEE C-2: National Electrical Safety Code
 - 5. TIA/EIA-607: Commercial Building Grounding/Bonding Requirements.
 - 6. Electronic Industries Association (EIA)
 - 7. Pertinent Local Codes and Standards

END OF PART 1 GENERAL

PART 2 PRODUCTS

2.1 ACCEPTABLE MAJOR MANUFACTURERS AND PRODUCTS

- A. JMA Wireless
- B. Commscope
- C. Corning
- D. Other products will be reviewed for acceptance on a per case basis.

2.2 SYSTEM COMPONENTS

- A. Reference accompanying Excel Bid Sheet documents for submittal format. Note that Bidders may provide their pricing in their native format but must also be provided in the Excel template provided.
- B. All connectivity, patch cords, wire management, surface raceway, and identification products used in this installation shall be manufactured by or equivalent to the specified system products.

2.3 WI-FI MINIMUM PERFORMANCE – OPTION

- A. Ubiquitous – High Density Wi-Fi.
 - 1. 11Mbps per user for 85% of venue capacity.
 - 2. Inclusive of but not limited to.
 - a. Bowl
 - b. Back of house / Premium spaces
 - c. Entries
 - d. Lobby

END OF PART 2 PRODUCT

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. All work outlined in this section is the responsibility of the Contractor unless otherwise noted. All dates referenced in this document are approximate projected dates and are subject to change.
- B. Contractor is required to provide all labor, materials, tools, supervision, and equipment to perform the following:
 - 1. Remove all existing equipment that is being replaced in this package. Return to the Owner all equipment requested by the Owner. Dispose of all equipment designated as such by the Owner.
 - 2. Remove and dispose of all packaging, scrap, and trash from new devices and materials.
 - 3. Provide and install all equipment required to conform to manufactures standards, including all equipment not specifically listed that is required to provide a completely functional system.
 - 4. Ensure all components above occupied areas are secondarily secured by manufacturer approved affixation e.g., safety cables and compliant with all relevant local, state, national codes.
 - 5. Contractor to provide all necessary precautions for protection of all facility components. Contractor is responsible for repair or replacement of any damaged facility components caused by the Contractor and/or any subcontractors hired by Contractor to perform work on site.
 - 6. Provide required electrical and data cable: connect all equipment with power, signal and control wiring.
 - 7. Coordinate with Owner regarding placement of new equipment rack(s) and electrical components.
 - 8. Provide all required permits and licenses.
 - 9. Provide a competent on-site installation supervisor
 - 10. Deliver all Equipment to site and convey to appropriate locations within site as directed by Owner.
 - 11. Store all Equipment in a safe and secure manner until installed, or otherwise directed by Owner.

3.2 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.

3.3 DAS SYSTEMS

- A. Grounding and Shielding.
 - 1. Mount and enclose all electrical and electronic equipment in metal enclosures, or equipment racks.
 - 2. Use EMT type conduit for all wiring outside of equipment racks except plenum rated wiring above a lay-in ceiling, and outdoor conduits and raceways, where separate insulated ground wiring shall be supplied.
 - 3. Use flexible conduits and PVC fittings to provide insulated connections from the building's electrical raceways to equipment racks. Mount all equipment racks at the job site in a manner which provides electrical isolation from the building structure and electrical raceways
- B. Wiring Practices
 - 1. Where specific instructions are not given, perform all wiring in strict adherence to standard systems engineering practices in accordance with the references listed.
 - 2. Group all wiring into the following classifications by power level or signal type:
 - a. RF
 - b. Fiber
 - c. Copper Data
 - d. AC Power Circuits
- C. Separate wiring of differing classifications by at least 6 inches, wherever possible.
- D. Separate power wiring from signal level wiring by at least 12 inches.

- E. 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.
- F. 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.
- G. Make network connections using approved mechanical connectors.
- H. Any required fiber splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be .05 db.
- I. Cable pulling lubrication shall be utilized when pulling cable in conduits.
- J. The bend radius for all cables shall conform to manufacturer's specifications.

3.4 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 and connector mounting plates in all boxes using 1/8" engraved lettering filled with 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.

3.5 ELECTRICAL 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. As part of the system upgrade the Contractor shall supply the required quantity of 30A, 3-Phase, 208 VAC circuit breakers for the existing LynTec electrical panels located on the Catwalk level. Please refer to the Bid Form equipment list for the required quantity.

- D. Electrical design and engineering must be reviewed and approved by the Owner prior to any electrical work by the Contractor.
- E. 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.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. Contractor to provide all required fiber transmitters and receivers. Contractor will be responsible to terminate and perform final connection of all cables.

3.6 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.

3.7 FINAL ADJUSTMENT AND COMMISSIONING

- A. The Contractor is responsible to provide a loudspeaker manufacturer's engineer to perform final system commissioning, including tuning and testing of the arena loudspeaker system, as part of the installation contract.
 - 1. Schedule a time for the Owner and Contractor to perform the Final Adjustment and Commissioning.
 - 2. Notify the Owner at least seven (7) days in advance, and prior to the scheduled system completion date.
- 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.

3.8 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

3.9 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 because 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 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