FLORIDA A&M UNIVERSITY
LAWSON CENTER & GAITHER HALL LED SYSTEM UPGRADES

TECHNICAL SPECIFICATIONS
LED DISPLAY SYSTEM(S)

PART 1 GENERAL

1.1 DESCRIPTION

A. The Contractor will furnish and install the LED Displays and video processing equipment as described in this RFP. Contractor is required to provide the design based on their product offering and provide an engineered stamped drawing set as part of their proposal per section 3.2.

B. The Contractor shall be responsible for the removal and disposal of all equipment being replaced as part of this RFP. Owner reserves the right to retain equipment for use in other venues on campus.

C. The Contractor shall be responsible for the provision and installation of hoist, structural reinforcements, primary and secondary steel, mounting brackets/hardware required. This includes all labor, materials, equipment; tools, transportation, and project management required for a complete and fully operational system(s).

D. Contractor to provide all primary and secondary electrical power for all displays. Contractor shall provide all distribution of power from nearest electrical distribution unit. Contractor is responsible for providing stamped electrical drawings by a licensed electrical engineer in the State of Florida.

E. Signal cable pathways/conduit as exists maybe re-used. All additional conduit and raceways required to complete a path to each display shall be furnished and installed by Contractor. All fiber will be provided, installed & terminated by designated Florida A&M vendor. Contractor shall be responsible to furnish, install fiber convertors & enclosures at each location needed to make new system(s) complete and fully operational. Any existing cabling that is operational, must be maintained.

F. A rendering package is provided as part of this bid package. The illustrations are to be construed as conceptual and not for construction purposes. Contractor shall be responsible for final engineering of the structural and electrical components required for new system(s), including professional engineering stamp by a licensed/registered engineer in the State of Florida.

G. Contractor is responsible for supplying a complete and fully operational system as intended by the RFP documents and any subsequent addendums. Prior to entering into a contract for the project, Proposer is responsible for notifying Owner of any equipment omissions in the RFP documents that would prevent the completion of a fully operational system. 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.

H. Contractor shall field verify all work site conditions, including dimensions and site lines prior to installation.

I. The Contractor will be wholly responsible to coordinate all of Contractor's activities with Owner including any permitting, scheduling, pre-planning logistics, and/or conduit/underground utilities locating. Owner has their own internal process for work on campus and Contractor shall coordinate these activities and plan this time into your schedule.

J. The Contractor will be wholly responsible for any necessary logistic, staging, planning, etc. required to access and execute the work. This includes any demolition, clearing and put back necessary to access the project or to create staging or storage areas. Contactor shall return all existing conditions and improvements to a condition equal to the condition it was found upon mobilization.

K. Contractor shall grant Owner a license to use all proprietary software provided with this RFP for the life of the system.

1.2 PROPOSER QUALIFICATIONS

A. Owner seeks to contract with a Proposer for the full performance of the work as described in this RFP and to obtain long-term service and support for all equipment supplied by the selected Proposer. In an effort to ensure the chosen Proposer 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 Proposer from consideration. The Owner, in its sole discretion, shall reserve the right to waive any or all of the requirements listed below.

1. Proposer shall provide a list of a minimum of five (5) Professional or Division 1 facilities (facility, contact name, title, address, and current phone number) where the Proposer has provided equipment and services of equivalent brand, size, and scope within the last 3 years. For each facility contact, at least one contact listed shall include the operator of the facility.

2. Proposer shall provide a minimum of two (2) Professional or Division 1 facilities (facility, contact name, title, address, and current phone number) where the Proposer has provided equipment and services of equivalent brand, size and scope that is at least five (5) years old.

3. Proposer 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 Proposer.
4. Proposer shall have a direct service employee or certified contractor capable of providing a response for all service calls and requests for information within one (1) hour during the warranty period and provide on-site repair service within 24 hours.
5. If Proposer is not the direct LED manufacturer, proposer to identify the LED manufacturer, location of factory and an executive level contact. All provided project references to meet the qualifications listed in this section must have been delivered using same manufacturer as proposed for this RFP.
6. Proposer shall include a draft copy of their contract for Owner's review. The Owner may issue their own contract or use Contractor's.

1.3 SUBMITTAL REQUIREMENTS

A. Initial Submittals and Shop Drawings

1. Contractor shall be required to provide submittals and shop drawings to Owner within fifteen (15) 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. The Owner and AJP must review and approve all submittal documents prior to the start of work. Contractor shall advise the Owner of any discrepancy that could 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:
    a. Submit one electronic set of shop drawings in PDF and .dwg formats, product data and samples together in one package within fifteen (15) calendar days of date shown on award notice to Contract and prior to ordering equipment.
    b. 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.
    c. Submit fabrication shop drawings for all displays including component weight and power calculations.
    d. Submit structural engineered drawings for all secondary steel framing required for this scope of work. Structural engineered drawings shall also include method of attachment for LED displays and all other signage elements required for this scope of work.
    e. Submit point-to-point wiring diagrams and typed wire lists identifying every connection. Indicate locations of all components. Identify cables by type, color, and wire numbers.
    f. Submit rack layouts indicating the proposed arrangement of mounted equipment including power junction box location. Rack layouts shall include front and rear views.
    g. Submit detail drawings of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.
    h. Submittal drawings shall indicate proposed color selections and finishes for all exposed surfaces and custom fabricated items. Submit actual color/finish samples, wall plates, and custom labels.
    i. Submit 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.
    j. Submit 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.
    k. Copies of all required business and contractor licenses.
    l. Copies of proof of insurance.
    m. 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.

n. 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.

B. Contract Closeout Submittal

1. 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. Closeout submittals shall include, but not be limited to:

a. Project Record Drawings (As-Built Drawings) including final screen fabrication drawings, secondary steel structural drawings, electrical drawings, system block diagrams, rack layout drawings, custom fabricated signage drawings (final fabrication version), and LED population and/or fluorescent lighting layout drawings for custom fabricated signage. As-Built Drawings shall be submitted in both PDF and .DWG formats.

b. 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.

c. 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).

d. Test reports from an independent testing & inspection agency certifying that bolted and/or welded connections for secondary structural steel meet the minimum requirements of the engineered structural drawings, the governing building code, or as required by the building official; whichever is more restrictive.

e. All testing reports as specified in Section 3.7 – Testing and Acceptance.

f. Provide test reports for all new fiber optic cable installed under this scope of work. Test reports shall indicate end to end signal loss does not exceed a maximum dB loss per Section 3.4.L and/or 3.4.M.

g. Operation & Maintenance Manual

Upon substantial completion and prior to on-site training with the Owner, Contractor shall provide four (4) final Operation & Maintenance Manuals (O&M Manuals). 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 no knowledge of LED displays or the associated control equipment and/or operating 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 control room rack equipment and LED display equipment written under the assumption that all equipment was in full powered off mode.

4) Full shutdown procedure for all control room rack equipment and LED display equipment written under the assumption that the facility is in an extended power failure situation.

5) Procedure for switching to back up LED display processors and back up graphics/animation servers.

6) Troubleshooting procedures for all LED displays, LED display processors, and all related equipment provided by Contractor. Troubleshooting procedures shall include demonstration photos and/or diagrams as required.

7) Maintenance procedures for all LED displays, LED display processors, and all related equipment provided by Contractor. Maintenance procedures shall include demonstration photos and/or diagrams as required. Contractor shall indicate whether maintenance procedures should be performed monthly, bi-annually, or annually.

8) 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.

9) All third-party equipment and/or “off-the-shelf” equipment warranties and a notarized System Warranty.

1.4 EQUIPMENT GENERAL SPECIFICATIONS

C. 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.

D. 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. This includes all cables internal to the displays, all cables between displays and control room, and all cables internal to the control room. These diagrams must be part of the Project documentation submitted to the Owner at time of acceptance.

E. Each device shall meet all its published manufacturer’s specifications. Verify performance as required.

F. Provide an uninterruptable 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. UPS should be easily removable (on rails with appropriate service loop) to service battery or should have external battery pack on rack unit above UPS.

G. Install all rack mounted equipment with Middle Atlantic Products HP Series truss head screws or approved equal.

H. Some rack-mounted equipment may require shaft locks, security covers, or removal of knobs; provide and install during Acceptance Testing.

I. Provide engraved self-adhesive phenolic 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.

J. All engraving shall be 1/8” block lettering unless noted otherwise. On dark panels or pushbuttons, letters shall be white. Letters shall be black on stainless steel, brushed natural aluminum plates or light-colored pushbuttons.

K. Per IEC-268 standard, all XLR connectors not mounted on equipment shall be wired pin 2 hot (high), pin 3 low, and pin 1 screen (shield).

L. Mounting Hardware exposed to the weather shall be aluminum, brass epoxy painted galvanized steel or stainless steel. Apply corrosion inhibitor to all threaded fittings.

M. Equipment Racks. Existing equipment racks may be re-used. Any unused rack space, as well as rack space created by the removal of equipment as part of this LED System upgrade, can be utilized. If contractor design requires more rack space, then Contractor to provide additional racks, Middle Atlantic Products model DWR-35-22PD, or approved equal, with accessories as noted below. If any existing racks are used, provide all accessories as noted below to bring to like-new condition. Quantity of racks shall be as required to house all equipment supplied under this scope of work. Any unused rack mounting spaces shall have blank panels to full enclose the rack assembly. Multiple racks shall be anchored together using appropriate ganging hardware. No rear doors shall be included

1. 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 100 degrees Fahrenheit.

2. Provide two (2) Middle Atlantic Products model LT-GN-PL gooseneck work light for each rack required for this scope of work.

3. 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.

N. Any rear mounted rack equipment shall be placed so the equipment does not block access to the back of front mounted equipment.

O. 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.

P. 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) (1" to 2" diameter) as appropriate. Flexible conduit shall be insulated from racks by approved insulating bushings. Buss bar shall be attached to building ground block in each location. Devices that have an external grounding option should be connected to the rack buss bar.

Q. Power wiring and signal/data wiring shall be installed on opposite sides of rack. Contractor may determine which side is using 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. There should be no signal/data wiring left in a service loop at the bottom of the rack to prevent electrical induction in the event of a lightning strike/power surge.

1.5 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).
2. National Electrical Manufacturers Association (NEMA)
3. American National Safety Institute (ANSI)
4. Occupational Safety and Health Administration (OSHA)
5. American Iron and Steel Institute (AISI)
6. Underwriters Laboratories (UL)
7. Federal Communications Commission (F.C.C.) Rules and Regulations, Part 76.
8. Society of Cable Television Engineers (S.C.T.E.)
9. Society of Motion Picture and Television Engineers (S.M.P.T.E.)
10. American Society of Testing Materials (A.S.T.M.)
11. National Cable Television Association (N.C.T.A)
12. Electronic Industries Association (E.I.A.)
13. Telecommunications Industries Association (T.I.A.)
14. Florida Building Code – Most Current Revision

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 Contractor's work to ensure proper conditions exist at site for the equipment and devices before their manufacture, fabrication, or installation. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.

J. 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.

K. After installation, submit photographs showing cable entries and terminations within equipment racks, enclosures, and pedestals at the job site.

1.6 WARRANTY AND SERVICE

A. Contractor shall warrant labor and materials for twenty-four (24) months following the date of Final Acceptance.

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. If repair is affected using Owners spare parts allotment, Contractor shall replenish all parts used to keep Owner's inventory at the amount required by the contract.

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 lighting unit or power supply replacement or the replacement of an internal display signal cable that does not require tools to perform the cable 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 servicing 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 entity responsible for providing the following emergency response availability:

1. Telephone service assistance and technical support from 8am to 11pm local time at Owner's facility, 7-days per week.

2. Answer all service calls and requests for information within one (1) hour during the warranty period and provide on-site repair service within 24 hours.

3. A parts exchange program, including same day shipment of exchange parts. The manufacturer shall keep a ready stock of key assemblies available to ship out upon notice of a parts failure if part is not available in spare parts inventory at Owner's facility.

4. 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.

J. Warranty shall cover all equipment, including processors, controllers, operating systems, and software.

K. 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 approximately 2-3 weeks prior to the start of the second and third seasons or as determined by Owner.

L. Contractor must notify Owner in writing within 90 days of expiration of warranty period.

M. Check-up shall include all regular maintenance; including filter changes, a complete inspection of all systems, brightness level readings of LED displays, parts replacement where required and a complete written report of all findings.

N. All extended warranty pricing requested in this RFP shall include the same requirements as stated in this section unless specifically excluded on the bid form

O. In addition to the base warranty, Contractor will provide a guarantee against systemic parts failures for a period of seven years from final acceptance. A systemic parts failure is defined as a failure of more than 5% of a particular part or component in a display, over a 12-month period. If it is determined that a systemic parts failure has occurred, Contractor will be responsible for all costs to remedy the problem to the satisfaction of the Owner.

P. Furthermore, if a particular system problem that resolves without a repair, presents itself in more than 2 consecutive events, Contractor will be responsible for providing on-site event support as well as system diagnosis, until the problem is identified and resolved. Some examples of this would be a signal flash, flickering, module(s) outage.

1.7 SPARE PARTS

A. Contractor shall supply a spare parts inventory containing 2% spare lighting units, 2% spare power supplies, and a minimum of one (1) of every other critical component including fiber modems. Supply a minimum of five (5) spare LED modules for any custom modules. Spare parts inventory shall be based on quantity of components used to manufacture the display(s). Contractor shall provide proposed spare parts inventory as part of the bid submission.

B. At the time of final sign-off, Contractor shall supply the specified spare parts inventory regardless of spare parts used during initial “shake out”, “burn in” and/or testing of newly installed displays.

C. Manufacturer of the LED system components shall continue to make all parts necessary for the continued functioning of the system for a minimum of seven (7) years after acceptance of this project. Furthermore, upon end of life of any component used in the LED displays, that is not replaced by a “backwards compatible” component, Manufacturer shall notify Owner of end-of-life status being given to components of this system and shall give Owner an opportunity to buy spare parts from stock or a last production run, at then commercially viable prices.

END OF PART 1 GENERAL

PART 2 PRODUCTS

2.1 CENTER HUNG LED MAIN VIDEO DISPLAYS

A. LED Supplier: Shall be listed on the proposal form. All LED to be Black Package.

B. Quantity – Four (4) indoor Video Displays – HDR Capable.

C. Size – 8.8’ tall by 12’6’ wide.

D. Resolution 448 x 640 based on 6mm pixel pitch.

E. Minimum Brightness: 1200 nits (100% white with automatic color-correction “on”) at startup.

F. System must maintain a minimum brightness level of 1000 nits throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

G. Display’s intensity shall be adjustable to a minimum of 256 levels.

H. Minimum 4,096 levels of intensity for each color (red, blue, pure green) 14-bit processing.

I. 4,500°-9,000° Kelvin color temperature. Color temperature shall remain constant across specified horizontal and vertical viewing angles.

J. Refresh rate shall be greater than 3,840+Hz.

K. Video frame rate at or greater than 60 frames per second.

L. Contrast ratio shall be greater than 4000:1.

M. IP rating shall be no less than 65 front and 54 rear.

N. Service accessibility for all components of the displays shall be from the front.

O. Pixel to Pixel Variation

1. 95% or more of pixels within each module must have a luminance within +/- 4% of the mean luminance for the module.
2. The average luminance of a column or row of pixels at the edge of a module or panel must be within +/- 2% of the average luminance of the module or panel.
3. 95% or more of the pixels within each module must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the module.

P. Module to Module Variation

1. 100% of the modules in a screen must have a luminance within +/- 4% of the mean luminance for the screen.
2. 100% of the adjacent modules (i.e., modules sharing a border) in a screen must have a luminance within +/- 3% of each other.
3. 100% of the modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the screen.
4. 100% of the adjacent modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.003 of each other.

Q. All uniformity specifications above apply across all specified minimum horizontal and vertical viewing angles and are to be met for an all White, all Red, all Green, and all Blue screen display.

R. All listed specifications must be maintained throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

S. Minimum of a 140° (±70°) horizontal viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

T. Minimum of a 140° (±70°) vertical viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

2.2 CENTER HUNG LED VIDEO DISPLAYS – LOWER RING

A. LED Supplier: Shall be listed on the proposal form. All LED to be Black Package.

B. Quantity – One (1) Indoor Radiused / Mitered Video Display – HDR Capable.

C. Size – 2.2' tall by 55.5' wide.

D. Resolution 112 x 2720 based on 6mm pixel pitch.

E. Minimum Brightness: 1200 nits (100% white with automatic color-correction "on") at startup.

F. System must maintain a minimum brightness level of 1000 nits throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

G. Display's intensity shall be adjustable to a minimum of 256 levels.

H. Minimum 4,096 levels of intensity for each color (red, blue, pure green) 14-bit processing.

I. 4,500°-9,000° Kelvin color temperature. Color temperature shall remain constant across specified horizontal and vertical viewing angles.

J. Refresh rate shall be greater than 3,840+Hz.

K. Video frame rate at or greater than 60 frames per second.

L. Contrast ratio shall be greater than 4000:1.

M. IP rating shall be no less than 65 front and 54 rear.

N. Service accessibility for all components of the displays shall be from the Rear.

O. Pixel to Pixel Variation

5. 95% or more of pixels within each module must have a luminance within +/- 4% of the mean luminance for the module.

6. The average luminance of a column or row of pixels at the edge of a module or panel must be within +/- 2% of the average luminance of the module or panel.

7. 95% or more of the pixels within each module must have a chromaticity value, Δu'v', within +/- 0.006 of the mean chromaticity value for the module.

P. Module to Module Variation

8. 100% of the modules in a screen must have a luminance within +/- 4% of the mean luminance for the screen.

9. 100% of the adjacent modules (i.e., modules sharing a border) in a screen must have a luminance within +/- 3% of each other.

10. 100% of the modules in a screen must have a chromaticity value, Δu'v', within +/- 0.006 of the mean chromaticity value for the screen.

11. 100% of the adjacent modules in a screen must have a chromaticity value, Δu'v', within +/- 0.003 of each other.

Q. All uniformity specifications above apply across all specified minimum horizontal and vertical viewing angles and are to be met for an all White, all Red, all Green, and all Blue screen display.

R. All listed specifications must be maintained throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

S. Minimum of a 140° (±70°) horizontal viewing angle. Defined at 50% of full intensity, with automatic color-correction "on", at stated angle maximum.

T. Minimum of a 140° (±70°) vertical viewing angle. Defined at 50% of full intensity, with automatic color-correction "on", at stated angle maximum.

2.3 COURTSIDE TABLE DISPLAYS

A. LED Supplier: Shall be listed on the proposal form. All LED to be Black Package.

B. Quantity – Two (2) indoor Video Displays – HDR Capable.

C. Size – 34" tall by 10' wide.

D. Resolution 126 x 1008 based on 6mm pixel pitch.

E. Minimum Brightness: 1200 nits (100% white with automatic color-correction “on”) at startup.

F. System must maintain a minimum brightness level of 1000 nits throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

G. Display’s intensity shall be adjustable to a minimum of 256 levels.

H. Minimum 4,096 levels of intensity for each color (red, blue, pure green) 14-bit processing.

I. 4,500°-9,000° Kelvin color temperature. Color temperature shall remain constant across specified horizontal and vertical viewing angles.

J. Refresh rate shall be greater than 3,840+Hz.

K. Video frame rate at or greater than 60 frames per second.

L. Contrast ratio shall be greater than 4000:1.

M. IP rating shall be no less than 65 front and 54 rear.

N. Service accessibility for all components of the displays shall be from the front.

O. Pixel to Pixel Variation

12. 95% or more of pixels within each module must have a luminance within +/- 4% of the mean luminance for the module.

13. The average luminance of a column or row of pixels at the edge of a module or panel must be within +/- 2% of the average luminance of the module or panel.

14. 95% or more of the pixels within each module must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the module.

P. Module to Module Variation

15. 100% of the modules in a screen must have a luminance within +/- 4% of the mean luminance for the screen.

16. 100% of the adjacent modules (i.e., modules sharing a border) in a screen must have a luminance within +/- 3% of each other.

17. 100% of the modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the screen.

18. 100% of the adjacent modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.003 of each other.

Q. All uniformity specifications above apply across all specified minimum horizontal and vertical viewing angles and are to be met for an all White, all Red, all Green, and all Blue screen display.

R. All listed specifications must be maintained throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

S. Minimum of a 140° (±70°) horizontal viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

T. Minimum of a 140° (±70°) vertical viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

2.4 ALTERNATE 1: CENTER HUNG MAIN & LOWER RING VIDEO DISPLAYS 4MM

A. LED Supplier: Shall be listed on the proposal form. All LED to be Black Package.

B. Quantity – Four (4) indoor Video Displays – HDR Capable.

C. Size – 8.8’ tall by 12’6’ wide.

D. Resolution 672 x 960 based on 4mm pixel pitch.

E. Quantity – One (1) Indoor Radiused / Mitered Video Displays – HDR Capable.

F. Size – 2.1’ tall by 53.3’ wide.

G. Resolution 169 x 4064 based on 4mm pixel pitch.

H. Minimum Brightness: 1200 nits (100% white with automatic color-correction “on”) at startup

I. System must maintain a minimum brightness level of 1000 nits throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

J. Display’s intensity shall be adjustable to a minimum of 256 levels.

K. Minimum 4,096 levels of intensity for each color (red, blue, pure green) 14-bit processing.

L. 4,500°-9,000° Kelvin color temperature. Color temperature shall remain constant across specified horizontal and vertical viewing angles.

M. Refresh rate shall be greater than 3,840+Hz.

N. Video frame rate at or greater than 60 frames per second.

O. Contrast ratio shall be greater than 4000:1.

P. IP rating shall be no less than 65 front and 54 rear.

Q. Service accessibility for all components of the displays shall be from the Top.

R. Pixel to Pixel Variation

19. 95% or more of pixels within each module must have a luminance within +/- 4% of the mean luminance for the module.

20. The average luminance of a column or row of pixels at the edge of a module or panel must be within +/- 2% of the average luminance of the module or panel.

21. 95% or more of the pixels within each module must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the module.

S. Module to Module Variation

22. 100% of the modules in a screen must have a luminance within +/- 4% of the mean luminance for the screen.

23. 100% of the adjacent modules (i.e., modules sharing a border) in a screen must have a luminance within +/- 3% of each other.

24. 100% of the modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.006 of the mean chromaticity value for the screen.

25. 100% of the adjacent modules in a screen must have a chromaticity value, Δu’v’, within +/- 0.003 of each other.

T. All uniformity specifications above apply across all specified minimum horizontal and vertical viewing angles and are to be met for an all White, all Red, all Green, and all Blue screen display.

U. All listed specifications must be maintained throughout the first 10,000 hours of use or 36 months from the time of acceptance, whichever is longer.

V. Minimum of a 140° (±70°) horizontal viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

W. Minimum of a 140° (±70°) vertical viewing angle. Defined at 50% of full intensity, with automatic color-correction “on”, at stated angle maximum.

2.5 COURTSIDE TABLE SPECIFICATIONS

A. Upholstery quality vinyl covered padding on ends and top in a color to be determined by the Owner. Vinyl shall be “Naugahyde” product or equal as approved.

B. Total of two (2) Tables of 10’ lengths.

C. Sections to be configured to allow connections for seamless display image.

D. Provide electrical and signal connections to “daisy chain” sections together.

E. Each table sections to be on locking casters and leveling feet.

F. Provide 34” maximum table height.

G. Provide 24” maximum counter depth.

H. Provide maximum of 38” total depth – display to back edge of table

I. Specific sizes may vary depending on location.

J. Provide 4” x 4” cable trough under tabletop with access holes every 4’ minimum

K. Provide AC power connections every 12” and data connections every 24” along entire length of table and interconnections for service to connect between table sections.

L. Provide trough for installation of the Owner provided temporary cabling i.e., data, phone, distributed TV.

M. Provide lexan cover over LED displays.

N. Protective Vinyl Covers for each table for use when tables are in storage

O. Plug strip Edison outlets on top of table should have 15a capacity per table.

P. Power to each table must have enough capacity to provide 15a 110v service to tabletop plug strip. Each tabletop plug strip should have a dedicated 15a breaker.

Q. Table should have a male inlet connector rated at the appropriate amperage for power input. Coordinate power needs and connector types with what the Owner has available to provide.

2.6 PROCESSING AND CONTROLS

A. Display control system must provide the ability to manage brightness (multi-level), video input, image position: size and scale, adjustable gamma correction, remote power function (power on/off), color, color temperature, contrast, and sharpness. Software/Interface has to be in the English language. Must be interfaced with at the Control Room – not at the scoreboard.

B. Processing to allow for electronic color and brightness calibration - block to block and pixel to pixel.

C. The processor shall support the following inputs: 1080P-HDR, HD-SDI video in either 720p or 1080i, SD-SDI (480p) and SDI 16x9 anamorphic signal, and DVI video.

D. Contractor is responsible for providing all required components, racks and wiring necessary to manage and control the video display from a location outside of the display housing.

E. 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.

2.7 OPERATING SYSTEM

A. 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.

B. 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.

C. 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.

D. Image playback is to be stutter-free for both static and animated graphics.

E. Contractor is responsible for providing all required components, racks and wiring necessary to manage and control the LED display from a location outside of the display housing.

F. 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.

G. Single button control for moments of exclusivity.

2.8 CHAIN MOTORS HOISTING SYSTEM

A. Chain motors shall meet all D8+ load and safety rating and be complete with the following:

1. An ingress protection (IP) rating of 66.
2. Adjustable limit switch.
3. Four hoist synchronization capability.
4. Wireless Control.

2.9 SCORING SYSTEMS – LAWSON CENTER

A. Shot clocks for each goal plus one spare (total of 3). Shot clocks shall be NBA style double sided transparent (see thru) style clocks and shall display game time and shot time. Large clock mounted parallel above the backboard glass shall be a maximum of 32.4” high by 31.7” wide by 6” deep and shall have 14” tall red LED’s for shot clock and 7” yellow LEDs for game time. Clocks shall include red LED strips around the perimeter that shall illuminate when time has expired. Clocks shall have camera mounting brackets.

B. New shot clock brackets for existing goals. Brackets for large shot clock shall be “fold down” style to permit storage of goals in existing location used by Owner.

C. Two sets plus one spare set of red LED light strips around the perimeter of each backboard glass. The current LED light strips may be re-used if compatible with new scoring controllers.

D. Ten (10) Locker Room Clocks – minimum 4-inch-tall red fixed LED digits with a maximum overall cabinet size of 1’-8” wide by 9” tall by 4” deep.

E. Install two (2) horns on Center Hung display.

F. Two (2) Scoreboard Controllers – (1) primary and 1 backup). Must be capable of scoring for Basketball and Volleyball.

G. One (1) Stats computer to interface with Stats crew for player stat displays.

H. Two (2) Data Distribution Panels. One (1) located in equipment rack in scoreboard control room and one (1) located at truck dock.

2.10 SCORING SYSTEMS – GAITHER GYMNASIUM

A. Provide and install (2) Fixed Digit Displays, Model OES M5010A or approved equal adapted for basketball, and volleyball

B. Two (2) Scoreboard Controllers – (1) primary and 1 backup). Must be capable of scoring for Basketball and Volleyball.

2.11 SIGNAGE AND AESTHETICS

A. Provide and install Illuminated Underbelly Signage on the center hung, as depicted, and specified in the rendering package.

B. Provide and install all trim and decorative elements on the center hung, as depicted, and specified in the rendering package.

C. Provide and install Provide and install Four (4) “Lawson Center” channel cut letters and header on the primary display as depicted and specified in the rendering package

2.12 ANIMATION PACKAGE

A. Provide 100 hours of content creation.

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. All work outlined in this section is the responsibility of the Contractor unless otherwise noted. Contractor is required to provide all labor, materials, tools, supervision, and equipment to perform the following:

1. 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.
2. Remove and dispose of all existing equipment that is being replaced in this package. Coordinate with Owner for any equipment that shall be retained.
3. Contractor to provide all necessary protection for 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.
4. Contractor is required to provide all labor, materials, tools, supervision, and equipment to perform the work outlined in this scope of work.
    a. Venue has a permanently installed playing surface. All necessary flooring protection shall be provided by the contractor.
    b. Any equipment of significant weight shall be approved by Florida A&M before use.
5. Provide and install all equipment and displays listed in Part 2 – Products, including any and all equipment not specifically listed that is required to provide a completely functional system. All primary and secondary steel required to install the displays shall be engineered, supplied, and installed by Contractor.
6. The Contractor shall be responsible for the provision and installation the hoist, primary and secondary steel, mounting brackets/hardware, and cladding as required. This includes all labor, materials, equipment; tools, transportation, and project management required for a complete and fully operational system(s).
    a. Existing overhead structural drawings with load capacity and existing speaker weights have been included in this package
7. For the Center Hung LED Video Display, there is an existing 400A 208V3P service in place. Contractor may re-use if sufficient power is available. Any rework of conductors, terminations, fuses, connectors, breakers, panelboards, conduits, etc. will be the responsibility of the Contractor. Contractor is responsible for providing stamped electrical drawings by a licensed electrical engineer in the state of Florida.
    a. Reference drawing EP4.43 &
8. For the Courtside Displays, there is sufficient capacity located at the event level in existing distribution panels. Any rework of conductors, terminations, fuses, connectors, breakers, panelboards, conduits, etc. will be the responsibility of the Contractor. Contractor is responsible for providing stamped electrical drawings by a licensed electrical engineer in the state of Florida.
9. For all LED Video Displays, Contractor may re-use signal cable conduits that exists between control room and Primary LED Display location. All additional conduit and raceways required to complete a path to the display locations shall be furnished and installed by Contractor. Contractor shall be responsible to furnish, install, and terminate all required cabling to make new system complete and fully operational. In addition to Contractor's system requirements, with exception as specified in section 3.4.
10. Furnish and install a complete, fully operational scoring system as per Section 2.7, including all power and signal cabling required for system.
11. Coordinate with Owner on placement of new equipment rack(s) and electrical components.
12. Provide all required permits and licenses.
13. Provide on-site installation supervisor.
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 otherwise directed by the project.

3.2 ENGINEERING

A. The Contractor must submit drawings and calculations stamped by a licensed engineer in the State of Florida for all foundations, primary and / or secondary steel whether existing or new.

B. Contractor is responsible for taking all seismic, wind and environmental considerations into account and making structural provisions for any such requirements.

C. Owner must approve all drawings in writing prior to the fabrication and installation of any equipment.

D. Engineered drawings are to include electrical.

3.3 STRUCTURAL CONSIDERATIONS

A. Contractor is responsible to design, engineer, build, deliver, install, integrate, and commission complete turnkey display as specified with all required structure needed to support all display components.

B. Contractor is responsible for the provision and installation of all primary and/or secondary steel including but not limited to catwalks, mounting brackets/hardware, and cladding as may be required. Contractor may re-use any existing primary and/or secondary steel but must bring re-used steel to like “new” condition.

C. Flashing and any other related equipment shall be the responsibility of the Contractor to furnish and install.

D. Contractor is responsible for erection of all materials related to the new equipment.

E. Sub-structure is to be fabricated using structural steel and/or aluminum (optional). Contractor shall provide necessary protective separation when connecting dissimilar metals to prevent galvanic corrosion.

F. Bolted and/or field welded connections shall be subject to special inspection by an independent testing & inspection agency certifying that bolted and/or welded connections meet the minimum requirements of the engineered structural drawings, the governing building code, or as required by the building official; whichever is more restrictive. Inspections shall take place prior to painting any connection.

G. Documentation shall be provided to Owner verifying acceptable results from all special inspections. All items failing inspection shall be repaired or replaced and re-inspected at no additional cost to the Owner.

H. All components to be painted and otherwise finished for exterior service conditions shall be warranted to be free of rust or other defects for a period of ten years.

I. All welders must be certified, and certificates must be on-site and available for inspection as requested.

J. To minimize fading or oxidation, all primary structural elements must be primed and coated or galvanized.

K. Damage to paint to the structure during the installation of secondary structure, video board and signage install shall be touched up by Contractor

3.4 ELECTRICAL AND DATA

A. The electrical design and installation of all branch circuits by the Contractor shall comply with NEC, provincial and local codes, as well as Owner regulations and guidelines.

B. Contractor shall provide remote power on/off for the LED display. Switches to be mounted into equipment racks along with other equipment provided by Contractor. Configuration of switches shall be submitted with shop drawings to be approved by Owner.

C. The Contractor shall provide electrical and data one-line diagrams.

D. Electrical design and engineering must be reviewed and approved by the Owner prior to any electrical work by the Contractor.

E. Contractor to provide a 4” x 4” J-Box at top/bottom of each rack with power circuit cabling terminating in 24” pig tails. Label each outlet as to which AC circuit is feeding it and provide the same information in the circuit breaker panel. Owner will provide all AC power and conduit to the equipment racks and will terminate AC power circuits within the J-Boxes.

F. The Contractor shall be responsible for termination and final connect of power to all displays. 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 including internal LED display power jumpers or power connections to signage elements. 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. Contractor shall not use SO cord or rubber jacket type power cables typically used on transportable installations or used on the installation of pitch side displays shall not be permitted for permanent installations. Strain relief on all connectors shall be per manufactures recommendations. Contractor shall submit manufacturers strain relief recommendations for all connectors during the submittal process.

I. The Contractor will be responsible for providing stamped electrical drawings. A licensed/registered engineer in the state of Florida where this project is located shall stamp all electrical drawings.

J. Any equipment not certified as required in Section 1.4.A. 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.

K. All fiber shall be furnished, installed, terminated & tested by Florida A&M vender.

L. Fiber installation location(s), style, quantity & desired terminations shall be provided to Florida A&M.

M. Contractor shall furnish & install enclosures as required at each location.

N. Contractor to provide all required fiber transmitters and receivers (including amplifiers where required). Contractor will be responsible to terminate and perform final connection of all cables from enclosures to display cabinets. Cables will be routed from the specified control locations to the display components per Contractor's diagram once the Owner has approved diagram.

3.5 AESTHETIC CONSIDERATIONS

A. Contractor shall assume premium finishes on all elements.

B. Prior to contract award, the Contractor must provide a comprehensive outline of all intended flashing and finish details for Owner approval. Failure to submit these details prior to contract award shall make Contractor responsible for all flashing and finishes as required by Owner at no additional cost to Owner.

C. No exposed bolts, inverted U channels, or unfinished edges on LED displays or signage elements shall be permitted on any surface with public view. Any part of the secondary steel frame exposed to public view shall be covered with flashing to match the edge of the LED display.

D. Unless specified differently on the AJP Drawings, the following shall serve as a minimum standard for products and finishes. Contractor shall be responsible to ensure that the material thickness provided is sufficient to prevent warping or "oil canning" on the span or sections of material installed.

1. Metals
    a. + .040" aluminum on internal baffling
    b. + .090" aluminum on flashing
    c. + .125" aluminum on any routed or primary surface
    d. + 12ga/2.6mm stainless steel (visible)
2. Plastics
    a. + .117" thickness on thermoformed polycarbonates
    b. + .177" thickness on flat polycarbonates
    c. + .125"thickness on flat acrylics
3. Finishes
    a. + Approved Automotive Grade Enamels
    b. + ASTM D3451-06 compliant Powder Coating
4. Vinyl Films
    a. + 3M, Avery, Oracal or other as approved.
    b. + 9oz weight for any outdoor banner (UV coated)

E. The Contractor shall not visibly display its trademarks or insignia on any of the Equipment or structural elements.

3.6 TRAINING

A. The Contractor at its own expense will provide designated Owner employees' 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. O&M Manuals per Section 1.3.B shall be provided to Owner prior to training.

C. The training shall cover the operation, routine maintenance and troubleshooting of the displays and control equipment.

D. Training shall consist of at least 24 hours (over the course of 3-5 days) of instruction. A recorded version of on-line training shall also be provided.

E. Contractor will be required to have a control systems operator and LED technician (both to be direct employees) on-site for the first event and continue to be on-site for a total of three (3) consecutive problem free events. Events to be selected by Owner. "Problem-free" constitutes an event where the video and scoring displays, control system, and any other components installed by the Contractor are without failure during an event. Each successful event will need to be signed off by the Owner until three (3) consecutive events are achieved.

3.7 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, integration with existing systems, diagnostic capabilities, screen brightness, color temperature and viewing angles.

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 official before the Owner will deem the system "Accepted"

1. LED Screens - Brightness and color uniformity shall be demonstrated and must meet the specification described. If the demonstration exhibits the display in noncompliance with the specifications, it will be the responsibility of the Contractor to make the necessary adjustments or to adjust, repair or replace the components necessary to meet the specifications. The Owner will not be responsible for any added costs as a result of an unsuccessful acceptance test.

2. Certain LED video displays included in this RFP are required to maintain minimum parameters over a specified period of time. The Owner at its sole discretion may engage an independent testing agency to verify the display's specifications, at any time during the specified period of time. Cost for this testing will borne by the Owner if display is complying. If the testing exhibits the display in noncompliance with the specifications, the cost of the testing will be the responsibility of the Contractor. Contractor will also be responsible to make the necessary adjustments or repair or replace the components necessary to meet the specifications. The Owner will not be responsible for any added costs as a result of an unsuccessful test.

3. Functionality of each of the displays and their control systems, as specified, shall be demonstrated in its entirety.

4. Acceptance of the system includes, but not limited to, the completed installation of all physical components and the issuance of the Certificate of Approval for code compliance by the Code Authority having Jurisdiction. Tests of the system shall not occur until after the system has been installed, and all work completed on the display systems.

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 (includes spare parts) 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 Owners 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