



ADDENDUM No. 1

Project: Performing Arts Center
Bedford North Lawrence HS
Bedford, Indiana
Project No: 1909.01
Date: September 13, 2019

This addendum is a part of the bid documents. Acknowledge receipt on the Proposal Form.

Specifications

Section 00 42 01 - Proposal Form - Part 1

Replace entire form with new form dated 09-12-19 attached listing alternative bid items

Section 26 5 61.01 - Stage Lighting and Controls:

Replace entire section with new, revised dated 09-12-19, attached.

Prepared by,

Hal E. Kovert, AIA
Principal

enclosed: Spec Section 00 42 01
Spec Section 26 5 61.01

file: 1909.01

End of Addendum No. 1 (28 total pages)

PROPOSAL FORM: PART I
Form 96 (Revised 2013)

CONTRACTOR'S BID FOR PUBLIC WORKS
Prescribed by the State Board of Accounts

CONTRACTORS BID FOR: **North Lawrence Community Schools**
BNL: PAC Theater Lighting Replacement
Bedford, Indiana

PART I
(Part I to be completed for all bids)

Date (Month, Day, Year): _____

Governmental Unit (Owner): **North Lawrence Community Schools**

County: _____

Bidder (Firm): _____

Address: _____

City, State, Zip: _____

Telephone No.: _____

Fax No.: _____

E-Mail Address: _____

Agent of Bidder: _____
(if applicable)

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of North Lawrence Community Schools in accordance with plans and specifications prepared by Kovert Hawkins Architects, Inc. and their consultants for the sum of:

BASE BID

Lump Sum _____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice.

ADDENDA

Acknowledges receipt of:

Addendum No. _____ () pages Dated _____

Addendum No. _____ () pages Dated _____

Addendum No. _____ () pages Dated _____

ALTERNATES

The undersigned also proposes to furnish or to omit all labor and materials necessary to complete work as required by the Alternate Bids, as provided in the specifications as follows:

Alternate No. 1: Additional Stage Lighting Fixtures ADD \$ _____

Alternate No. 2: Follow Spots ADD \$ _____

Alternate No. 3: Replace Lobby Lamps ADD \$ _____

ALLOWANCES

By initialing adjacent to amounts below, bidder acknowledges allowance amounts are included in the forgoing bid:

Contingency Allowance within the **Base Bid** per Section 01220 **\$ 10,000** initials _____

COMPLETION OF WORK

Undersigned guarantees, if awarded contract, to complete the work within _____() calendar days.

DISCRIMINATION

The Contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the Contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS (if applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

NON-COLLUSION AFFIDAVIT

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding. He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly, any rebate, fee, gift, commission or thing of value on account of such sale.

GENERAL CONTRACTOR CERTIFICATION

I hereby certify that we have obtained a complete set of construction documents, including all Drawings, Specifications and Addenda, and have reviewed the jobsite to sufficiently familiarize ourselves with the existing conditions.

Dated at _____ this _____ day of _____, 20____.

(Name of Organization)

BY _____

(Title of Person Signing)

OATH AND AFFIRMATION

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing bid for public works are true and correct.

Dated at _____ this _____ day of _____, 20____.

(Name of Organization)

BY _____

(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____

COUNTY OF _____

Before me, a Notary Public, personally appeared the above-named _____ and
(Name of Person Signing)
swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public

My Commission Expires: _____

County of Residence: _____

ACCEPTANCE

The above bid is accepted this _____ day of _____, 20____,

subject to the following conditions: _____
_____.

Contracting Authority Members:

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

END OF SECTION 00 42 01

SECTION 26 5 61.01 – STAGE LIGHTING AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

- A. To ensure a fully-functional system, it is the intent of the specification that this package of equipment be purchased through a qualified theatrical dealer/integrator.

- B. Base Bid:
 - 1. Relay panel (RP-1)
 - a. DMX controlled
 - b. Main breaker (may be a separate disconnect)
 - c. Commissioning

 - 2. Dimmer Panel (DR-1)
 - a. DMX controlled
 - b. Main breaker (may be a separate disconnect)
 - c. Commissioning

 - 3. Network control infrastructure:
 - a. Lighting data management devices
 - 1) Network to DMX interfaces as required for house light DMX and relay panel control
 - b. Lighting data (DMX) receptacles
 - c. Lighting network receptacles
 - d. Lighting network cabling and testing
 - e. Commissioning

 - 4. Wall Controls
 - a. (1) Preset stations: locations per drawings, 8 buttons.
 - b. (2) LCD stations: locations per drawings, 10" touch screen.
 - c. (1) Portable LCD station, 10" touch screen

 - 5. Power Distribution Devices
 - a. Floor pocket replacement inserts
 - 1) (8) With microphone jack
 - 2) (3) Without microphone jack
 - b. (2) Sidewall connector strips (approximately 6'-0" long, field verify)
 - c. (4) Wall pocket replacement plates
 - d. (3) Plugstrips, electrics 1, 2, 3: length approx.. 45'-0" long, field verify. Circuits per drawings. Provide new gridiron junction boxes and multicables.
 - e. (19) Plugboxes: locations and circuits per drawings.

 - 6. Portable theatrical fixtures:
 - a. 10, LED ellipsoidal spotlights with 19 degree lens tubes (Side wall house left and right)
 - b. 16 LED ellipsoidal spotlights with 19 degree lens tubes (Catwalk)
 - c. 21, LED PAR fixtures (stage electrics back light)
 - d. 9, LED cyclorama wash fixtures (stage electrics)

7. Accessories (in addition to materials specified with fixtures):
 - a. 10, 10' DMX cables
 - b. 6, 25' DMX cables
 - c. 6, 50' DMX cables
 - d. 10, 25' Powercon jumper cables
 - e. 10, 5' Powercon jumper cables
 - f. 1, 600 foot spool 1/8" unglazed black tie line
 - g. 2, 1-circuit portable dimmers
 8. Control console
 - a. 1,536 (3 universe) channels
 - b. 2, touch screen monitors
 9. Stage edge lighting
 - a. Red LED
 - b. 12" o.c. spacing
 - c. Runs as shown
 10. House lighting
 - a. Mains dlim – fixture model and beam as shown
 - b. Pendants and recessed
 - c. New fixtures are required; existing fixtures are in poor condition.
- C. Alternate #1: Additional Stage Lighting Fixtures
1. Portable theatrical fixtures:
 - a. 28, LED PAR fixtures (stage electrics front light)
- D. Alternate #2: Follow spotlights
1. Portable theatrical fixtures:
 - a. 2, follow spotlights
- E. Alternate #3: Replace Lobby Lamps
1. Lobby and Vestibule
 - a. PAR lamps as noted, including installation

1.02 ACTION SUBMITTALS

- A. With bid:
1. Bill of materials
- B. Shop drawings shall be submitted electronically or, if paper, in no less than four (4) copies for approval unless additional copies are required by the General Conditions. One set will be returned to the Architect for transmittal to the Contractor from the Consultant marked "No Exceptions Taken", "Make Corrections Noted", or Resubmit Rejected". Drawings marked other than "No Exceptions Taken" shall be revised and resubmitted until no exceptions are taken. Fabrication may begin on items marked "Make Corrections Noted" while drawings are being revised and resubmitted for final approval. Include:
1. Product Data: Indicate compliance with reference standards, current performance data, application recommendations and product limitations.
 2. Shop Drawings: Assembly and installation drawings showing product components in assembly. General system drawings shall be scaled no less than 1/4"=1'-0". Details shall be scaled as necessary to clearly illustrate Contractor's intent.

- C. As-Built Drawings and Maintenance/Operation Manuals shall be furnished as required by Division 1.
 - 1. Items to be included in the Manuals are:
 - 1. Safety rules and safety directions for operation. Maximum load limits for all assemblies.
 - 2. As-built drawings and schematic diagrams.
 - 3. List of components for all assemblies, with part/model numbers, including manufacturers' addresses and phone numbers.
 - 4. Inspection check sheets with maintenance schedules.
 - 5. Name, address, and telephone number of manufacturer, installer, architect, and consultant for guidance of future service personnel.

1.03 QUALITY ASSURANCE

- A. Standards:
 - 1. All applicable requirements of Division 1 govern all work in this section.
 - 2. All equipment and work: comply with "Codes and Standards".
 - 3. All equipment and components: approved and listed by a Nationally Recognized Testing Laboratory (NRTL) where applicable standards have been established.
 - 4. All equipment: manufactured and tested in accordance with the applicable portions of the latest editions of U/L, NEMA, ASA, AIEE, and IPECA standards.
 - 5. National Fire Protection Association. "National Electrical Code" (NEC) as adopted by the State of Indiana.
 - 6. International Building Code as applicable and as adopted by the State of Indiana.
 - 7. Trade Standards, including the latest revisions of all applicable standards and codes published by the following organizations:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing Materials (ASTM)
 - c. American Iron and Steel Institute (AISI)
 - d. National Electrical Manufacturers Association (NEMA)
 - e. American Society of Mechanical Engineers (ASME)
 - f. Society of Automotive Engineers (SAE)
 - g. Society of Motion Picture and Television Engineers (SMPTE)
- B. Where devices and material are mentioned by name and/or model number, it shall be interpreted as referring to that particular item as completely specified in the manufacturer's published data as though that data and literature were printed herein in their entirety.
- C. Any cabinets, racks, or other components which must be separated from contiguous parts to enable shipment and/or handling at the site shall be furnished complete with all necessary connecting hardware, bus bars, wire jumpers, etc., to provide a complete, functioning system when reassembled in the building.
- D. All Equipment: the products of one supplier; complete with all required apparatus, devices, controls, accessories, etc.
- E. **Theatrical dealer/integrator: must be a factory authorized dealer AND service center for the manufacturer of the major components of the system.**

1.04 PRODUCT SUBSTITUTION REQUESTS

- A. Unless specifically stated, specified products are assumed to have no “or equals” products for this project.
- B. Bidders are advised that proposals to substitute equivalent theatrical equipment will be considered subject to the provisions of Division 0 and 1 as they apply to Product Substitution requests. In no event will substitution requests less than ten (10) business days prior to the bid be considered. All proposals will be judged on the basis of equivalent quality, performance, track record and price. The Consultant and Architect shall be the sole judges of such equivalency.
- C. Proposals to substitute equipment shall include sufficient catalogue data, specifications, technical data and samples to enable the Theatre Consultant and Architect to evaluate them.
- D. The initial sample submittal shall be the basis upon which the qualifications of the bid will be determined. One (1) sample submission from any given Bidder will be permitted. Subsequent quality escalation through repeated sample submittals from the same bidder will not be allowed nor will modification of the original samples be permitted.
- E. The Architect or Consultant reserves the right to make such examination of the samples as he may consider necessary to determine their quality and compliance with the specification, even to the destruction of the samples, and such determination by the Architect or Consultant shall be final. The acceptable samples shall be retained for comparison with the equipment ultimately furnished and will be returned afterward to the bidder at their request and at their expense. Bidders will not be allowed to examine the samples of another bidder.

1.05 WARRANTY

- A. All systems, including all parts and labor, shall be under full warranty for a period of not less than two (2) years from the date of written final acceptance. In the event that any of the equipment should fail to produce capacities or meet design characteristics as specified, it shall be replaced with equipment that will meet requirements without additional cost. After occupancy, any necessary work performed shall be done at the convenience of the Owner's operational schedule, including overtime, if required.

PART 2 - PRODUCTS

2.01 DMX/ETHERNET 8-PORT NODE, RACK MOUNTED

- A. General
 - 1. Provide four-port DMX nodes to permit DMX512 and RDM data to be encoded, routed and decoded over a conventional 10/100Base-T Cat5 (twisted pair copper) Ethernet network.
 - 2. Each node shall incorporate four (8) gold-plated 5-pin rear-mounted XLR-type female connectors, or four (8) Phoenix-type rear-mounted screw terminal connectors, or four (8) EtherCon™ rear-mounted RJ-45 female connectors, for DMX/RDM ports.
 - 3. Each node shall also incorporate one external 10/100 Ethernet port utilizing a rear-mounted EtherCon™ RJ-45 type female jack.
 - 4. Nodes shall incorporate a manual user interface consisting of an encoder knob with integral pushbutton and a backlit graphical LCD display for identification (soft-labeling) and status reporting. Labeling shall be user configurable.
 - 5. Nodes shall be capable of encoding or decoding DMX data to or from any industry standard Ethernet lighting control protocol and certain commonly used proprietary Ethernet protocols.

B. DMX Ports

1. DMX ports shall comply with the requirements of the ANSI E1.11 DMX512-A standard, and the USITT DMX512 (1990) standard.
2. DMX ports shall be fully electrically isolated from the Ethernet network infrastructure and chassis ground.
3. DMX ports shall be capable of being user-configured as inputs, outputs or not used (available).
4. Each DMX port shall include three front panel LEDs to indicate port direction, data activity and isolated power status.
5. The DMX output update (refresh) rate shall be user-selectable between rates of 31Hz, 36Hz, 40Hz, and 44Hz (maximum possible rate). The update rate shall be user selectable on a port-by-port basis.
6. DMX ports configured as outputs shall support ANSI E1.20 RDM (Remote Device Management).
7. DMX ports shall provide connections for signal common, the primary data pair, and connection points only for the secondary (optional) data pair.

C. Ethernet Port

1. The Ethernet port shall comply with the requirements of the IEEE 802.3 10/100Base-T standard.
2. The Ethernet port shall include LED indicators for Link status and 10/100 speed status.

D. Processor

1. Each node shall have sufficient processing power to merge up to four (4) incoming DMX universes with respect to each output port.
2. The CPU shall be capable of processing up to sixteen (16) megabits per second of network traffic without any dropped packets.
3. Maximum delay time from input to output shall not be greater than one DMX packet time (approximately 30 mSec.).
4. Node firmware shall be stored in non-volatile (Flash) memory. It shall be possible to upload new firmware files via the Ethernet port.

E. Mechanical

1. The node housing shall be constructed of die-cast aluminum and steel.
2. Nodes shall be of pleasing appearance, suitable for high-visibility locations.
3. Nodes shall be designed to mount in a single unit of 19" rack space and shall include all necessary mounting hardware for this purpose.
4. It shall be possible to mount two nodes side-by-side in a single unit of 19" rack space and all necessary mounting hardware for this purpose shall be included.
5. Nodes shall be provided in satin black textured powder-coat finish.

F. Electrical

1. There shall be 2500-volt electrical isolation between power supply and low voltage circuits.
2. There shall be 1500-volt electrical isolation between adjacent DMX I/O sections.
3. Each DMX I/O port shall be capable of withstanding the continuous application of up to 48V, and transient application of up to 250V, without damage to internal components.

Protection shall be of a self-resetting type, rated for 250V. Replaceable fuses are not acceptable.

G. Power Supply

1. Power for the nodes shall be provided over the Ethernet cable, complying with IEEE 802.3af Power-over-Ethernet (PoE). Products requiring the installation of additional wiring for power shall not be acceptable.
2. The node electronics shall be electrically isolated from the power supplied over the Ethernet cable.
3. Power may be provided from IEEE 802.3af compliant network switches, or by using conventional switches together with mid-span insertion power supplies.
4. Auxiliary DC power connection (18-60VDC, 6 watts) shall be provided as an alternative to POE.

H. Configuration

1. Node identification (naming), DMX port direction, universe patching and all other configuration shall be accomplished using a personal computer connected to the Ethernet port. The node manufacturer shall provide the configuration software for this function (see Section 11).
2. All nodes on the same network shall be remotely configurable from a personal computer connected to the Ethernet network.
3. Once configuration is done, the nodes shall not require a computer to be present on the network for proper operation.
4. All configuration and operational data shall be stored in non-volatile memory in each node.
5. It shall be possible for a personal computer connected to the Ethernet network, to download from a system of all connected nodes, all their configuration and operational data, such that a complete new system configuration file can be created and saved in the computer.
6. It shall be possible to make configuration changes at any time during live performance without interrupting or otherwise adversely affecting the flow of DMX data through the system, with the exception of the specific port(s) directly affected by the changes.

I. DMX Routing

1. It shall be possible for the user to route complete DMX universes from any input port to any DMX output port at any node. It shall be possible to route universes to any number of nodes. Routing shall be configured from a personal computer running the configuration software.
2. It shall further be possible to route individual DMX channels (or ranges of channels) from any input port to any output port. Routing shall be configured from the configuration software.
3. It shall be possible to merge whole universes or individual DMX channels to any output port.
4. It shall be possible to prioritize input universes or individual channels routed to any output port.
5. Where two or more control sources are prioritized with respect to a given DMX channel or universe, the system shall be capable of cross-fading between sources as they are
6. The computer shall only be required for configuration and signal routing assignment, and shall not be required for the normal operation of the system.
7. All relevant routing information shall be stored in non-volatile memory at each node. The system shall recover from a power outage without requiring a computer to be online.

J. Network

1. Communications physical layer shall comply with the IEEE 802.3 10/100Base-T Ethernet specification. Products offering only 10Base-T connectivity shall not be acceptable.
2. All network cabling shall be Cat5e or Cat6 conforming to TIA-568A/B, and shall be installed and certified by a qualified network installer.
3. Data transport shall utilize the TCP/IP suite of protocols to transfer the DMX and RDM data.
4. Nodes shall support industry standard ANSI E1.31 Streaming ACN.
5. Nodes shall also support ETCNet3, Pathport Protocol, Art-Net, and Strand ShowNet.
6. Nodes shall be capable of accepting DMX level data from any or all of the above named protocols simultaneously.

K. Management Software

1. Provide and install node management software to allow the user to discover, configure and monitor all nodes in the system.
2. The software shall be capable of managing individual nodes or all installed nodes in the system simultaneously.
3. Software that can manage only one node at a time shall not be acceptable.
4. The software shall provide an intuitive graphical user interface for all configuration and monitoring functions.
5. The software shall include an RDM master controller function.
6. The software shall provide a comprehensive log of all user-initiated and system-generated status and error messages to aid in troubleshooting.
7. The software shall include password protection to prevent unauthorized access.
8. The software shall be compatible with Windows, Macintosh and Linux operating systems.

L. System Requirements

1. Provide the quantity and type of nodes required, as indicated on the drawings and schedules.

M. Compliance

1. The DMX/RDM Gateway nodes shall be compliant with the RoHS directive.
2. The DMX/RDM Gateway nodes shall conform to all FCC and CE requirements.

N. Manufacturers:

1. Pathway Connectivity
2. Strand Lighting

2.02 RELAY PANEL (RP-1)

A. Overview

1. The lighting control panel shall be fully digital, designed specifically for architectural and entertainment lighting control applications, and shall consist of 12, 24, 36 or 48 relays per panel, as required by the drawings.

B. Mechanical

1. The relay panel shall be a wall-mount, dead-front switchboard, substantially framed and enclosed with 16-gauge, formed steel panels. All panel components shall be properly treated, primed and finished in fine texture, scratch resistant, silver powder coat paint.

C. Installation

1. A wall mount enclosure shall be available to ship separately to permit wall mounting and conduit stub in. The relay sub panel shall be factory pre-wired and dressed. The contractor shall provide and terminate all feed, load and control wiring on screw terminals fitted within the panel.
2. Cable entry for all panels shall be on the top of the panel. Knockouts shall also be available on the sides of the panel to simplify wiring.
3. All terminations and internal wiring shall be accessible via a removable front cover panel. The Processor Module shall be accessible for programming at all times.

D. Electrical

1. The power efficiency of the relay panel shall be greater than 95% at full load.
2. A "Panic" facility shall close selected relays if the Processor Module is removed or fails. Relays are selected from the panel processor. It shall also be possible to select "Panic" as follows:
 - a. The panel processor on the front of the panel selects "Panic" and "Normal" operation.
 - b. Remote maintained contact closure for Fire Alarm interface.
 - c. Two remote momentary contact closures for "Panic" and "Normal" respectively.
3. The system ground shall be made at a grounding lug in the panel.
4. The panel shall have a 14,000 AIC fault current rating at 277 volts.
5. The panel shall be suitable for surface or recess mounting.

E. Panel Electronics, Physical

1. The main panel control electronics shall be housed in one Panel Processor Module (RPM). The panel control electronics shall be completely digital without employing any digital to analog demultiplexing schemes.
2. All panel setup and preset data shall be stored in a non-volatile manner and may be transferred to a replacement Panel Processor Module without losing data.
3. Each Panel Processor Module shall have a back-lit LCD display with a keypad for panel setup, preset control, testing, panel status, error and diagnostics.
4. LEDs shall indicate "DMX512 Port A", "DMX512 Port B" (ShowNet), Vision.net control and Power.
5. The Panel Processor Module shall be permanently mounted inside the panel. The RPM shall provide all necessary low voltage signal connections. The RPM shall provide the only point for contractor connection of signal cables and PANIC activation. The contractor connections shall be made with two-part plug in screw terminals (dedicated connector per input) for ease of installation.
6. All DMX512 & RS485 communication ports and remote contact input connections shall be optically isolated from all processor electronics by a minimum of 2,500V RMS isolation.

7. The Panel Processor shall have the provision to select any of the relay or outputs to be activated by the PANIC function. The PANIC function shall be activated or de-activated by one or more local or remote contact closures.

F. Panel Electronics, Control And Communications

1. The control electronics shall provide the following control and communication inputs as standard:
 - a. One optically isolated DMX512 control input.
 - b. An RS485 control input for Vision.net architectural control. Vision.net is a control system comprised of architectural style panels for recording and playback of presets in individual assigned "rooms".
 - c. There shall be two programmable panic inputs.
 - d. One RS232 Serial programming port for remote programming using PC based configuration software.
2. The system shall support an optional ShowNet Ethernet input to provide an additional input plus processor status monitoring and configuration.

G. Mechanical

1. Relays shall be snap in factory wired units in single or double pole configurations.
2. All relays shall be designed for repeat operation with mechanically operated contacts.
3. Relays may be operated locally with a manual over-ride.

H. Electrical

1. Power connections shall be made on compression screw terminals. Control signal connections shall be made via plug-in connectors at each module chassis.
2. Load connections shall be via compression screw terminals on a terminal block.
3. Relays shall be rated for 120/230/277/347 volts.
 - a. All relays shall be capable of continuous operation at full rated load. They shall be rated for tungsten, LED, cold cathode and HID loads.
 - b. Each assigned relay shall have a programmable switching threshold between 1 and 99%.
 - c. All relays shall have a local control switch to turn the relay on for testing and diagnostic purposes.

I. Manufacturer:

- | | | |
|--------------------------------------|--------|-------------|
| 1. Strand Lighting: | Model: | Contact |
| 2. Intelligent Lighting Controls: | Model: | LightLEEDer |
| a. Requires a separate breaker panel | | |

2.03 DIMMER PANEL (DR-1)

A. A21 Dimmer Rack

1. Overview.
 - a. The dimmer cabinets shall be fully digital, designed specifically for architectural and entertainment lighting applications, and shall consist of 3 or 6 or 9 dimmer module

spaces, depending on cabinet size. A secondary "slave" 3, 6 or 9-module expansion cabinet shall also be available. Dimmer systems shall be listed by an NRTL.

- b. Cabinet setup and preset data shall, as standard, be fully user programmable on a per cabinet or system wide basis.
2. Mechanical.
 - a. The dimmer cabinet shall be a wall-mount, dead-front switchboard, substantially framed and enclosed with 16-gauge, formed steel panels. All cabinet components shall be properly treated, primed and finished in fine texture, scratch resistant powder coat paint.
 - b. The system shall be convection cooled and fans shall not be required. Systems requiring forced air-cooling shall not be acceptable.
 - c. Dimmer module over-temperature sensing shall be provided, and the module will shut down until the temperature falls to within acceptable limits.
 3. Installation.
 - a. The cabinet shall be factory pre-wired and dressed. The contractor shall provide and terminate all feed, load and control wiring on screw terminals fitted within the cabinet.
 - b. All terminations and internal wiring shall be accessible via a removable front cover panel. The Processor Module shall be accessible for programming at all times.
 4. Electrical.
 - a. The power efficiency of the dimmer cabinet shall be greater than 95% at full load.
 - b. Each 6 and 9 module dimmer rack shall support an optional Main breaker.
 5. Cabinet Electronics, Physical.
 - a. The main dimmer control electronics shall be housed in one Rack Processor Module (RPM). The dimmer control electronics shall be completely digital without employing any digital to analog demultiplexing schemes or analog ramping circuits.
 - b. All rack setup and preset data shall be stored in a non-volatile manner.
 - c. Each Rack Processor Module shall have a back-lit LCD display with a keypad for rack setup, preset control, testing, rack status, error and diagnostics.
 - d. All DMX512 & RS485 communication ports and remote contact input connections shall be optically isolated from all processor electronics by a minimum of 2,500V RMS isolation.
 6. Rack Electronics, Control And Communications.
 - a. The control electronics shall provide the following control and communication inputs as standard:

- 1) One optically isolated DMX512 control input.
- 2) An RS485 control input for Vision.net architectural control. Vision.net is a control system comprised of architectural style panels for recording and playback of presets in individual assigned "rooms".
- 3) There shall be two programmable panic inputs.
- 4) One RS232 Serial programming port for remote programming using PC based configuration software.

7. Rack Electronics, Features.

- a. Dimmer control electronics shall have 16 bit (minimum) fade processing and a dimmer update rate better than 16 ms (60 Hz). Dimmers set to the same level shall output within +/- .5V of each other, regardless of phase or input voltage, providing the desired level is less than the phase input voltage less the dimmer insertion voltage.
- b. Dimmer output levels shall be regulated for incoming line voltage variations. The regulation shall adjust for both RMS voltage and frequency changes of the incoming AC wave form. Regulation shall maintain the desired output voltage +/- .5V volt for the entire operation range (90 - 277 VAC). The regulation shall compensate for variations of the AC waveform on a dimmer-by-dimmer basis. There shall be no interaction between dimmers in the system or any other equipment. The output shall be regulated to the user programmable maximum voltage level on a dimmer-by-dimmer basis between 24V and 277V for dimmer modules. The processor response time to incoming line changes shall take no more than 16 ms (60 Hz). Dimming systems that do not respond to line voltage and frequency variations shall not be acceptable.
- c. The control electronics shall allow the maximum output levels of individual dimmers to be adjusted, e.g. to compensate for load circuit voltage loss. The selected dimmer curve shall regulate so that the curve is proportional to the programmed maximum voltage.
- d. The RPM shall also have the capability to support dimmers of different types and sizes that may be mixed throughout the rack. Individual dimmers may be dimmed or switched (non-dim). The individual phase control or switching of positive and negative line voltage half cycles shall not be acceptable, as the net resultant DC line current may damage or degrade line supply transformers.

B. A21 POWER MODULE SPECIFICATIONS.

1. Mechanical.

- a. Power Modules shall be factory wired units of similar size and heavy duty metal construction, designed to be installed into the cabinet as a self contained bolt-in assembly. A plastic Power Module chassis shall not be acceptable.
- b. Modules shall be finished in powder coat black paint.

2. Electrical.

- a. Power connections shall be made on compression screw terminals. Control signal connections shall be made via plug-in connectors at each module chassis.
- b. Load connections shall be via compression screw terminals on a terminal block.
- c. Power Modules shall be suitable for 120V or 277V, 60Hz.
- d. Each dimmer shall maintain its output RMS voltage within 2% for changes in load from 200 watts to full rated load at any point on the dimming curve.
- e. The power efficiency of each power module shall be better than 97% at full load. Adequate heat sinking shall be provided.
- f. Standard Module electronics shall be completely solid state using two silicon controlled rectifiers (SCR's) per dimmer in inverse parallel configuration.
- g. SCR devices shall be encapsulated in an epoxy filled high impact plastic case with opto isolator, trigger SCR, steering bridge and snubber network. There shall be a minimum of 2500 volts isolation between the ac line and control lines of the SCR sub-assembly.
- h. IGBT dimmer modules shall be available in Quad 1000 watt or dual 2000 watt variants with a choice of 120V or 277V modules.
- i. Each dimmer shall be protected by thermal magnetic circuit breaker of the appropriate capacity mounted on the faceplate of the cabinet. This protective device shall have a "must trip" rating of 125% of rated capacity and be rated for a minimum 10,000 Amp interrupting capacity.
 - 1) It shall be possible to use the breaker as a dimmer disconnect device and shall be a UL, cUL listed.
 - 2) Under overload conditions, the breaker will disconnect power to the dimmer to protect the power device.
 - 3) The full load current shall be carried and controlled by the SCR or IGBT power device. Dimmers employing Triacs shall not be acceptable.
 - 4) All Power Modules shall be capable of continuous operation at full rated load. Under no circumstances will Modules allowing continued operation with loads substantially in excess of the rated capacity be acceptable.
 - 5) Each assigned Non-Dim shall have a programmable switching threshold between 1 and 99%.
 - 6) At full load under normal operating conditions, voltage insertion loss in the dimmer shall be typically less than 2 volts, but shall not exceed 4 volts
 - 7) The maximum output voltage level for each individual dimmer shall be programmable from the keypad to any desired point with automatic re-calculation of the assigned dimmer curve across the permitted voltage range.
 - 8) All dimmers shall have a local control switch to turn the dimmer on for testing and diagnostic purposes.
 - 9) Dimmer racks shall ship with a dimmer bypass jumper installed on the load terminal blocks. This bypass jumper shall permit loads to be tested and operated from the dimmer rack circuit breakers prior to installation of the system control stations. These jumpers shall be removed at system commissioning. Systems not offering this feature shall not be accepted.
 - 10) Each dimmer shall have a local test button to permit testing dimmer modules when they are installed without requiring access to system control stations. IGBT dimmer modules shall also feature diagnostic LED indicators for system trouble shooting.

2.04 DISTRIBUTION DEVICES

- A. Connector Strip: Listed and labeled by an NRTL; factory-wired wireway and receptacle assembly.
1. Wireway: Steel or extruded aluminum, with removable cover and nominal cross-section dimensions of 3 by 4-1/2 inches.
 2. NEMA 5-15 Receptacles (120V): Duplex, flush mounted.
 3. NEMA L6-20 Receptacles (208V): Flush mounted.
 4. CAT5e Receptacles (N): Flush mounted, provided with voltage barrier.
 5. DMX Receptacles (DMX): Flush mounting, provided with voltage barrier, 5-pin female XLR.
 6. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 7. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 8. Lighting data output (CAT5e/DMX): if integral to plugstrip, provide with voltage barrier.
 9. Mounting Hardware: Double-pipe brackets, custom pipe spacing to accommodate work lights.
 10. Finish: Manufacturer's standard black finish.
 11. Circuit Identification: 2" high, die-cut white numbers. Numbers shall be applied to both sides of connector strips where the second side can be seen.
 12. On-stage connector strips only: LED work lights shall be permanently installed on bottom of the raceway. Fixtures are to be permanently wired.
 - a. Fixture manufacturer: Cree Lighting
 - b. Model: LS4 5000 lumen, 3000K color temperature
- B. Pipe Mount Plug Boxes: Listed and labeled by an NRTL; factory-wired wireway and receptacle assembly, length as required to house the quantity of circuits indicated; with the following features:
1. Wireway: Steel or extruded aluminum, with removable cover and nominal cross-section dimensions of 3 by 4-1/2 inches.
 2. NEMA 5-15 Receptacles (120V): Duplex, flush mounted.
 3. CAT5e Receptacles (N): Flush mounted, provided with voltage barrier.
 4. DMX Receptacles (DMX): Flush mounting, provided with voltage barrier, 5-pin female XLR.
 5. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 6. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 7. Pipe Mounting: provide with U-bolts for pipe mounting.
 8. Finish: Manufacturer's standard black finish.
 9. Circuit Identification: 2" high, die-cut white numbers.
- C. Wall Box Cover Plates: Factory-wired receptacle assembly, size as required to fit existing boxes; with the following features:
1. NEMA 5-15 Receptacles: Duplex, flush mounted.
 2. CAT5e Receptacles (N): Flush mounted, provided with voltage barrier.
 3. DMX Receptacles (DMX): Flush mounting, provided with voltage barrier, 5-pin female XLR.
 4. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 5. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 6. Mounting: refer to drawings.
 7. Finish: Manufacturer's standard black finish.
 8. Circuit Identification: 1" high, die-cut white numbers.

- D. Floor Pocket Insert Plates: Factory-wired receptacle assembly, size as required to fit existing boxes; with the following features:
 - 1. NEMA 5-15 Receptacles: Duplex, flush mounted.
 - 2. CAT5e Receptacles (N): Flush mounted, provided with voltage barrier.
 - 3. DMX Receptacles (DMX): Flush mounting, provided with voltage barrier, 5-pin female XLR.
 - 4. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 - 5. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 - 6. Mounting: refer to drawings.
 - 7. Finish: Manufacturer's standard black finish.
 - 8. Circuit Identification: 1" high, die-cut white numbers.

- E. Gridiron Junction Boxes: Listed and labeled by an NRTL; factory wired with terminal strips and concentric knockouts on all sides.
 - 1. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 - 2. Accessories: cable strain relief grips for each cable.
 - 3. Finish: Manufacturer's standard black finish.
 - 4. Label exterior of each box with circuit numbers served by that box.

2.05 WIRE AND CABLE

- A. Building Wire in Raceways: Comply with requirements specified in Division 16 Section "Low-Voltage Electrical Power Conductors and Cables."

- B. Portable Power Cable: Listed and labeled by an NRTL; flexible stage and lighting power cable; Type SO, SOW, or SOOW; 600 V; multiconductor; 60 deg C temperature rating.

- C. Ethernet Cabling: Comply with requirements specified in Division 16 Section "Control-Voltage Electrical Power Cables."
 - 1. For 10/100BaseT, comply with provisions for UTP cable and hardware.
 - 2. All exposed wire is to be black.

- D. ANSI E1.11 (USITT DMX512-A) Control Cabling: Comply with requirements specified in Division 26 Section "Control-Voltage Electrical Power Cables."

2.06 THEATRICAL CONTROL CONSOLE

- A. General Description.
 - 1. The lighting control console shall be microprocessor based and specifically designed to provide complete control of stage, studio and entertainment lighting systems. An open architecture system using non-proprietary interfaces to permit upgradeability shall be used.
 - 2. The system shall provide control of up 100 Universes of DMX (51,200 output parameters) over 25,000 control channels. Output shall be distributed over a 10/100/1024 MB Ethernet network using Philips Strand Lighting ShowNet, E1.31 (sACN), Pathport, KiNet 1 & 2, ArtNet, simultaneously as well as E1.11 -2008 USITT DMX 512/1990-A outputs over four (4) DMX 5pin XLR outputs.
 - 3. The system shall support full bi-directional RDM communication with compatible RDM Network devices via the four (4) DMX connections on the Neo control console. RDM communication shall adhere to ANSI standard E1.20-2006 Entertainment Technology – RDM – Remote Device Management over DMX512 Networks.

4. An infinite number of cues, cue lists, groups, presets, palettes, macros, effects, snapshots may be contained in non-volatile electronic memory and stored to an onboard solid-state hard drive and to Recorded cue lists (Unlimited) may be played back simultaneously on up to 95 faders (including optional wing faders). Channels shall, by default, respond to cue information by last instruction, with timing control provided for all cues.
5. The Neo control console may be programmed in Tracking, Hybrid Tracking or Cue Only mode by the user as a system default and overridden on individual record actions as required.
6. A Master A/B motorized fader set shall be provided. The 60mm motorized fader set can execute move fades. Five (5) Additional 60mm motorized playback faders are also provided for multiple cue playback options over an unlimited number of fader pages.
7. Ten (10) 60mm motorized multifunction faders are also provided in addition to the above. These multifunction faders give the end user additional playback faders, additive, inhibitive or effect submasters. Two (2) dedicated, addressable motorized grand masters and one rate master are provided as well.
8. A rate master shall be provided. The 60mm motorized fader can be set to execute all master timing across the console functionality allowing for "on the fly" busking timing.
9. A set of four (4) push button soft touch encoders and companion LCD play back screens shall be included for control of multichannel luminaires. Each LCD playback screen will give the user feedback on the rotary encoders state, value, and graphic. Encoders may be operated in coarse or fine mode. Tactile feedback for full frame operations shall be provided. .
10. A high-resolution level wheel shall be provided to control intensity for selected channels and scrolling/zoom for some displays.
11. An integrated track ball and alpha-numeric keyboard shall be included for screen navigation, software interaction, cue labeling, patch labeling, or non -numeric command line functions using the Alpha numeric text call up function feature.
12. Each Control Console shall support up to three (3) HD multi-touch monitors and support HDMI, DVI, and Display Port device outputs. Each display is user definable.
13. Control surface buttons shall be backlit. The backlighting shall provide indication of functional states through both color change and intensity. Back lit buttons shall also indicate "follow me" programming which will allow the novice user to follow the next key press sequences needed when command line programming.
14. Control and programming features for intelligent lighting fixtures shall also include: a standard library of fixture profiles, the ability to copy and edit existing profiles and create new profiles and patch displays.
15. User-definable, interactive displays may be created – magic sheet view. These displays, which can be used in live and blind operating modes, allow graphical layout of channels and system shortcuts such as Palettes and Groups.
16. Software upgrades shall be made by the user via USB flash drive; changing internal components shall not be required.
17. Show data may be created and modified on a personal computer, using either Windows 7, or Windows 8 operating systems, with a free offline editing application. The program shall also allow output to visualization software supporting the same protocols as the lighting system.
18. FTB (full tracking back up) Synchronized backup shall be provided via another full console on the network or by use of a remote processor unit. The backup console or Rack mount controller shall maintain synchronized playback with the master and shall take over control of the lighting system upon loss of communication with the master, either automatically or upon user confirmation.
19. Multiple users may access show data from the main control console. Each user shall have an individual workspace. User identification may be assigned to more than one control

- device, allowing users to work in tandem, or allowing a remote access user to mirror the current display format and mode.
20. Show files are simultaneously saved across the system to each mapped integral hard drive, flash drives and external network drives.
 21. The control console shall provide a pull out drawer housing an external alpha-numeric keypad and USB Charging and Data Port.
 22. The lighting control console shall feature a flexible hardware and software design. Control channel counts, automated lighting support, help files, and additional control hardware shall be easily upgradeable.
 23. Minor revisions of operating software and an off-line editor shall be available to the user via download from the manufacturer's web site at no additional cost. Console software shall be upgradeable in the field via Internet download.
 24. The lighting control console software shall feature a familiar and easy-to use Windows graphical user interface (GUI) based on the Windows operating system. Software features shall include Off-line Editor, Remote Video, Media Player, Web Browser, and PDF Reader.
 25. The dedicated Windows processor architecture shall deny access to operating system, but shall allow access to an open hard drive for show files. Processor back up shall be supported by the use of any Windows 7, or later, computer running the PC version of the lighting control console software.

B. PHYSICAL

1. Console Physical & Electrical.

- a. The console controls and electronics shall be a desktop configuration and shall use a high density multicore Intel microprocessor.
- b. The console shall be constructed of steel with an aluminum face panel. All internal control components shall be fully modular to permit simple removal and exchange. The top panel shall be easily removed via thumb screws to allow for easy access to the internal components of the console.
- c. The central processor shall be fully integrated into the main console in a separate removable enclosure for rapid removal and exchange. The processor shall include a 120GB solid state hard drive (minimum), standard computer I/O and an integrated USB hub for connection of all console control electronics to the system processor.
- d. The Control Console shall be universal in power requirements and shall support from 90-240 volt 50-60Hz power systems. The integrated power supply shall also support the power requirements of additional future accessories.
- e. The Measure of the control console shall not exceed 20" (508 mm) x 31" (787.4mm) x 5" (127mm)

C. Required accessories:

1. Dust Cover
2. (2) Console lights
3. (1) 25' EtherCON cable
4. Keyboard (either integral or wireless)
5. Wireless Mouse
6. (2) 22" touch screens
7. (3) universes of control

D. Manufacturers & Models

- | | | |
|---------------------------------|--------|-------|
| 1. Strand Lighting: | Model: | NEO |
| 2. Electronic Theater Controls: | Model: | IonXE |

2.07 WALL CONTROLS

A. SYSTEM OVERVIEW

1. System shall be a fully integrated digital lighting control system, utilizing digital communications between stations, and the control devices (dimmers, relays, and DMX-512 controlled equipment) in the system as required.

B. GENERAL

1. The lighting system shall be fully scalable to meet the needs of complexes of any size. Each complex can consist of up to 1000 areas.
2. Each area shall support up to 255 rooms with a maximum of 127 control channels per room, which can be connected to an unlimited number of dimmers, relays, or DMX512 controlled equipment. The control connection between stations shall be via standard Cat 5e cable.

C. TOUCHSCREEN STATIONS

1. All touchscreens shall be full color displays. Systems that do not support color displays shall not be acceptable.
2. Each display shall support multiple tabs to allow users to organize their displays to meet a wide range of applications. Tabs shall support the following applications:
 - a. Programmable Sliders that can be scaled and programmed as both channel controls and submasters. Flexible fader sizes are available allowing system programmers to optimize the number of faders displayed on screen for maximum flexibility. Users may also select from a range of fader styles to suit their application.
 - b. Touchscreen buttons shall be available in a variety of sizes and shapes permitting system designers the flexibility to allow buttons to define their function through size, shape and color.
 - c. Buttons shall support both text labeling and icons. A broad character set shall be supported including Chinese and Arabic characters.
 - d. All displays, faders, buttons and tabs shall have text labels in a choice of fonts, sizes and colors.
 - e. Real Time clock display with full system programming.

D. CONTROL STATIONS

1. Mechanical
 - a. The control station faceplates shall be free of visible fasteners and shall be of a pleasing aesthetic appearance.
 - b. Control stations shall be supplied standard with a white finish, optional custom colors shall be available on request.
 - c. On control stations with sliders, the sliders shall have 1.75" (45mm) travel with matching slider knobs.
 - d. Control station push buttons shall have matching button caps with long life programmable LED backlighting. The backlight intensity shall be fully adjustable to allow for ambient lighting conditions. Backlighting shall be user definable with a choice of Blue, Amber or White. Different backlighting colors may be programmed to indicate the state of each button.
 - e. Key caps shall be available with optional custom engraving.
 - f. Each station shall inputs for up to 8 photo cells or occupancy sensors or any combination of these devices. The function of the sensors shall be programmable using the system design software and may be updated at any time.
2. Installation.

- a. 2 gang and larger control stations require flush mounted masonry ("ears-in") back boxes, with a minimum depth of 3.5" (90mm). Back boxes must be grounded / earthed in accordance with local wiring practices to provide a discharge path to ground for static electricity.
- b. Control stations shall be supplied complete with a sub-plate, which is screwed to the flush mounting back box with the screws provided. The sub-plate allows the control station to be hinged into position and secured with hexagonal setscrews on the bottom edge of the trim ring.
- c. Touchscreen stations shall be available with surface and flush mount enclosures designed to simplify station mounting.
- d. Data line terminations shall be via a screw-terminal plug and socket to facilitate removing a control station while maintaining the continuity of the data network.

E. PUSHBUTTON STATIONS

- 1. All button stations shall be fully configurable.
- 2. Each button may be assigned any of the following functions:
 - a. Preset.
 - b. Preset/Off.
 - c. Toggle.
 - d. Smart.
 - e. Raise.
 - f. Lower.
 - g. State / Mode.
 - h. Room Link.
 - i. Console button.
 - j. Share Button.
 - k. Set Clock.
 - l. Suspend Clock.
 - m. Toggle Master.
 - n. Screen Saver.

F. Manufacturers & Models

- | | | |
|------------------------------|--------|------------|
| 1. Strand Lighting: | Model: | Vision.net |
| 2. Interactive Technologies: | Model: | CueServer2 |

2.08 LED ELLIPSOIDAL:

A. Finish:

- 1. Black

B. Supply each fixture with:

- 1. 5 foot power cable with Edison connector
- 2. 10 foot long DMX cable
- 3. C-clamp
- 4. Safety cable
- 5. Color frame.
- 6. Soft focus pattern holder.
- 7. Lens tube per part 1.

C. Manufacturers & Models

- | | | | |
|----|------------------|--------|---------------|
| 1. | Altman Lighting: | Model: | PHX2 LED RGBW |
| 2. | AC Lighting: | Model: | Prolights |

2.09 LED PAR:

- A. Finish:
1. Black
- B. Supply each fixture with:
1. 5 foot power cable with Edison connector
 2. 10 foot long DMX cable
 3. C-clamp
 4. Safety cable
- C. Manufacturers & Models
- | | | | |
|----|------------------|--------|--------------------|
| 1. | Strand Lighting: | Model: | Showline SLPAR 155 |
| 2. | Vari-Lite | Model: | VL800 Pro Par |
| 3. | Altman Lighting: | Model: | AP-150 |

2.10 LED CYCLORAMA LIGHT

- A. Finish:
1. Black
- B. Supply each fixture with:
1. 5 foot power cable with Edison connector
 2. 10 foot long DMX cable
 3. C-clamp & yoke
 4. Safety cable
- C. Manufacturers
- | | | | |
|----|------------------|--------|-----------------|
| 1. | Strand Lighting: | Model: | PLCYC1 MKII |
| 2. | Altman Lighting: | Model: | Spectra Cyc 100 |

2.11 FOLLOWSPOTS

- A. Throw is greater than 125 feet. Output should exceed 50 footcandles at that distance.
- B. LED source is preferred but not required.
- C. A. Supply each fixture as a kit with:
1. Followspot
 2. Color Changer
 3. Tripod with Casters
 4. Iris
 5. Dowser/Dimmer
 6. 15 foot (minimum) power cord with Edison connector installed
- D. B. Manufacturers:
- | | | | |
|----|-------|--------|---------|
| 1. | Ushio | Model: | SAI-500 |
|----|-------|--------|---------|

2.12 C-CLAMPS

- A. All C-clamps shall be permanently marked with a load rating. Cast C-clamps are not acceptable.
- B. The Light Source Mega-Clamp or equal.

2.13 DMX Cables

- A. 10'-0" long unless specified otherwise.
- B. 5 pin XLR-type connectors.
- C. Heavy-duty cable construction intended for use as a portable data cable in a stage environment.
- D. Manufacturers:
 - 1. LEX
 - 2. Elation
 - 3. Four Star

2.14 CONNECTORS

- A. NEMA 5-15 ("Edison") unless otherwise noted.

2.15 STAGE EDGE LIGHTING

- A. LED spacing: 12" O.C.
- B. LED color: red
- C. Dimmable transformers as required
- D. Flush install extrusion
- E. (3) runs as shown (downstage runs are switched by orchestra pit lift controls)
- F. Manufacturer:
 - 1. Vista Manufacturing

2.16 HOUSE LIGHTING

- A. General
 - 1. The luminaire shall be a full spectrum fixed white LED downlight employing a single LED emitter that is actively cooled. The Luminaire shall be the Chalice 150 or Chalice 70 down light by Altman Stage Lighting, Inc. or approved equal.
 - 2. The luminaire shall incorporate a state of the art microprocessor-controlled solid state LED light engine, and on-board power supply.
 - 3. The luminaire shall have the ability to house several different fixed white LED choices of 2700K, 3000K, 4000K, & 5000K each with CRI above 89.

- A. Set permanently mounted items level, plumb, and square with ceilings and walls.
- B. Loose accessories: assembled and delivered to Owner.

3.03 Installation & setup, fixtures

- A. Unpack, assemble, and hang fixtures at designated locations.
- B. Set DMX addresses and personalities (LED fixtures).
- C. Generally aim fixtures to stage.
- D. Install portable data cabling as required. Use tie line to neatly dress all cabling.
- E. Test all fixtures for correct function with wall controls and console.

3.04 Commissioning

- A. All Ethernet runs must be checked for proper operation.
- B. All DMX runs must be checked for proper operation.
- C. Configure all permanent and portable nodes.
- D. Create patch and program for wall controls.
- E. Create patch and program for console.

3.05 WORKMANSHIP

- A. The fabrication of all equipment: incorporate only new and unused materials. This includes all metal components in various shapes required such as plate, bar, rod, castings, structural shapes, stampings, forgings, clamps, bolts, and all other accessories not mentioned.
- B. The mechanical fabrication and workmanship: incorporate neat and mechanically acceptable practices such as clean drilled and punched holes without flash; hand smooth finish for all sheared, machined, and cut edges; and proper fit of component and contiguous parts without irregularity where matching is intended. Welding shall meet qualifications of AWS D1.1-81 and shall be without spatter and other evidence of poor practice. All bolts and rivets shall be sized and located in conformity with minimum acceptable standards as set forth in the Machinery's Handbook and all revisions to date.

3.06 PAINTING

- A. Manufacturer's standard.

3.07 COMPLETION

- B. If inspection reveals any detail of construction or fabrication not in strict accord with the specification or the contract requirements, approval and payment will be withheld in accordance with the General Conditions. The cost of any additional inspections on the part of the

Architect/Consultant caused by the theatrical system not being completed when the inspection is called will be borne by the Contractor.

- C. Turn over all loose accessories to Owner. Store as directed. Obtain a receipt for materials.
- D. Notify Architect and Consultant of completion schedule.
- E. Provide the following demonstration and instruction periods in cooperation with Consultant:
 - 1. Lighting System: 4 hours.
 - 2. Video recording of this session is not required, though the Owner may do so.
- F. Provide two additional training sessions at the convenience of the Owner's schedule:
 - 1. Video recording of these additional sessions is not required, though the Owner may do so.
 - 2. 2 hours, not sooner than 2 months following nor more than 4 months following the initial training.
 - 3. 2 hours, not sooner than 4 months following nor more than 8 months following the initial training.
- G. At the completion of work this Contractor shall remove all rubbish and accumulated materials not caused by other trades from the building and shall leave the work areas in a clean, orderly, and acceptable condition. Materials remaining the property of the Owner will be stored as directed.
- H. Furnish all required operation/maintenance manuals.

END OF SECTION 26 5561