SECTION 116173
THEATRICAL LIGHTING FIXTURES AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Furnish the following major elements and associated accessories:
   a. Theatrical lighting fixtures and accessories
      1) LED Source Fixtures
      2) Incandescent Source Fixtures
      3) Automated Fixtures
      4) Accessories
      5) Portable Stage Cable
      6) Lamps
      7) Hardware
      8) Color frames, clamps and safety cables
      9) Theatrical Lighting Consoles and accessories
2. Provide all materials, components and services required to provide the work as specified herein, elsewhere in the project documents and/or as shown on related drawings.
3. Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.

B. Products Supplied But Not Installed Under This Section
1. Lighting fixtures and accessories will be delivered to the site. Site has no loading dock or forklift. Equipment to be delivered to designated space within the building. Unpacking and assembly by the Owner.

C. Related Requirements
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.
2. Examine Contract Documents for requirements that directly affect or are affected by work of this Section. A list of those Documents and Sections includes, but is not limited to the following:
   a. Division 01 – General Requirements
   b. Division 11 – Equipment
      1) Section 116133 – Theatrical Rigging
      2) Section 116163 – Theatrical Lighting Dimming and Control
   c. Division 26 – Electrical

1.2 PRICE AND PAYMENT PROCEDURES

A. Refer to Division 01 – General Requirements for information regarding price and payment procedures.

B. Unit prices
1. Provide a unit price for each line item identified in the Appendix to this specification.
a. The Owner may adjust quantities before award of bid based on unit pricing.

1.3 REFERENCES

A. Abbreviations:
1. The following abbreviations and acronyms are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
   a. DMX or DMX 512: ANSI E1.11 - 2008, USITT DMX512-A
   b. NFPA: National Fire Protection Association
   c. NEC: National Electric Code
   d. UL: Underwriters Laboratories
   e. IEEE: Institute of Electronic and Electrical Engineers
   f. IESNA: Illuminating Engineering Society of North America
   g. ANSI: American National Standards Institute
   h. AISC: American Institute of Steel Construction
   i. NEMA: National Electrical Manufacturers Association
   j. TIA/EIA: Electronic Industries Alliance/Telecommunications Industry Association

B. Definitions:
1. The following definitions are relevant to this Section and are in addition to those defined in Division 01 – General Requirements:
   a. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.
   b. “Architect”: All references to the “Architect”, Hamilton Anderson Associates, will refer to the process by which the indicated action or decision regarding the work in this section will be administered. All such actions shall be initiated with or by the Architect, who will disseminate all pertinent information and documents to, as well as coordinate all efforts and site visits with, the Theatre Consultant and all other project consultants who may have design responsibility relating to the work in this section.
   c. “Theatre Consultant”: Auerbach + Associates, Inc. (d.b.a. Auerbach Pollock Friedlander). The Theatre Consultant will be party to all actions and decisions regarding the work in this section.
   d. “Other Project Consultants”: Acoustical Consultant, Electrical Engineer, Structural Engineer, or Mechanical Engineer as is applicable to a particular issue.
   e. “Contractor”: Manufacturer / Installer responsible for the fabrication and installation of the work contained in this section.
      1) Contractors involved with other work shall be indicated with a specific trade preceding the word “Contractor” (i.e. General, Electrical, etc.).
   f. “Owner”: Authorized personnel representing Wayne State University.
   g. “Furnish”: Purchase and/or fabricate and deliver to project site.
   h. “Install”: Physically install the items in their proper location(s) on the project site.
   i. “Provide”: Furnish.

C. Reference Standards:
1. Reference Division 01 for general project references and standards.
2. References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
3. If an applicable code or standard permits work of lesser quality or extent than this specification, then this specification and the related drawings will govern.

4. Comply with national, state and local codes.

5. Comply with national, state and local labor regulations and requirements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. The Contractor is required through drawings, memos and meetings to properly coordinate the work with the other sections as necessary to complete the work of this section.

B. Sequencing:
   1. The delivery and installation of the equipment in this section shall be coordinated with other work which may be in conflict with or which must be completed before the work under this section may be installed.

1.5 ACTION SUBMITTALS

A. All submittals shall be submitted in accordance with Division 01.

B. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing project schedule.

C. Submittals will be reviewed, accepted and field dimension verified prior to proceeding with the fabrication of the work in this section.

D. All submittals shall leave space available for review stamps and comments.

E. The Architect and Theatre Consultant shall only mark one set of drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.

F. Provide insurance against loss or damage during shipment. Furnish certifications of such coverage to the Owner not less than 60 calendar days prior to the shipment of any equipment.

G. Product Data:
   1. Where standard manufacturer parts are used, submit current product literature describing component, manufacturer’s recommended applications, load ratings, safety factors and dimensions. The data shall include all information which indicates compliance with the specifications herein.
   2. Clearly indicate specific component and applicable options.

H. Shop Drawings:
   1. Provide shop drawings on D size minimum (24” x 36”) sheets.
   2. Provide complete, fully dimensioned, large-scale shop drawings of all non-standard components. Include item-identifying number.
   3. Provide indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.
   4. Provide a full Bill of Materials to be supplied, including quantities, manufacturer, manufacturer’s part number, manufacturer’s catalog number, etc. Clearly indicate the type and quantity of lamps being supplied for each fixture.
5. All custom elements shall be engineered. Provide approved drawings stamped by a Professional Engineer licensed in the project jurisdiction. The engineer shall verify that the equipment supplied under this section meets or exceeds the design criteria of this specification.

I. Samples
1. Submit samples items for approval within 14 days of Architect’s written request. These items may include, but are not limited to:
   a. Individual fixtures
   b. Mounting hardware
   c. Connectors

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents:
   1. Submit documents in accordance with Division 01 – General Requirements.
   2. At the time of delivery, submit three (3) copies of parts lists and maintenance instruction sheets.
   3. Within 60 days of delivery, submit one (1) set of reproducible inventories of all equipment provided.
   4. Submit operation and maintenance manuals with the final inventories. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
      a. Complete parts list for all equipment and telephone numbers for the authorized parts and service distributors.
      b. Instructions as to the safe operation for all equipment.
      c. Recommended maintenance schedule for component parts, which may need periodic replacement.
      d. Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
   5. Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.
   6. Warranties as required herein.

B. The record documents shall be reviewed by the Architect and all modifications to the documents stemming from this review shall be made as required.

C. Above submissions are required as a condition for final approval of the work.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts:
   1. Furnish a package of spare parts for user-serviceable portions of the equipment.
   2. Label all spare parts with manufacturer’s part number, designation and description, and location(s) where used.
   3. Furnish durable, clearly labeled storage containers for spare parts, including special static free containers for electronically sensitive parts.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Refer to Division 01 – General Requirements.

B. Qualifications:
1. All equipment within this specification is to be the responsibility of a single Contractor. Provision of such equipment shall comprise no less than 90% of the Contractor's business.
2. The Contractor shall be a factory-authorized distributor and servicer for all of the specified equipment.
3. Contractor shall maintain a full-time Manufacturer-trained and certified field technician available on an emergency basis within 4 hours travel of the project location.
4. The Contractor shall have, at the time of bid, a current contractor's license and shall know, understand, and have the required documentation to work in the State of Michigan. This license shall be maintained throughout the course of the work of this contract.

C. Contractor is responsible for proper operation and safety of all component equipment.

D. Contractor is responsible for the complete design and engineering of all systems described herein. Contractor shall confirm project details and, if necessary, suggest modifications to the criteria established herein in order to maintain the design intent.

E. Errors and omissions within the Contract Documents shall not relieve the Contractor of the responsibility for providing properly functioning theatrical lighting fixtures and accessories as described herein.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage and handling shall be coordinated with the Owner and shall meet all requirements described in Division 01.

B. Packing, Shipping, Handling and Unloading
1. All equipment shall be appropriately and substantially packed for shipment.
2. All equipment containers shall clearly indicate the equipment contained, “front”, “top”, “fragile”, the project name, and theatre site allocation. Include packing and shipping lists for each container.
3. Deliver to: 77 W. Canfield, Detroit, MI 48201.
4. Site has no loading dock or forklift. Equipment to be delivered to designated space within the building.
5. All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.

C. Acceptance at Site
1. Coordinate responsibility for acceptance of material and equipment at job site with the Owner.

1.10 SITE CONDITIONS

A. Environmental Requirements
1. Coordinate all environmental requirements for all materials provided and installed under this contract.
1.11 WARRANTY

A. Comply with the warranty requirements of Division 01 and the following.

B. Contractor shall warrant materials and workmanship of systems and equipment installed as free of defects. The Contractor shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of one (1) year following date of final acceptance. Ordinary wear and defects due to improper usage are excepted.

C. During the warranty period, all emergency conditions where systems failures may be hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.

D. During the Warranty Period, for each product that uses software, furnish manufacturer’s software updates to the Owner for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following listed manufacturers are indicative of the quality and features for the equipment specified herein:

1. LED Source Fixtures
   a. Electronic Theatre Controls
   b. Altman Stage Lighting

2. Automated Fixtures
   a. Martin
   b. High End Systems
   c. Robe
   d. Electronic Theatre Controls

3. Accessories
   a. City Theatrical
   b. Fehr Brothers
   c. The Light Source
   d. Electronic Theatre Controls

4. Lamps
   a. General Electric
   b. Osram
   c. Sylvania
   d. Ushio
   e. LEDs per fixture manufacturer standard

5. Portable Stage Cable
   a. Lex Products
   b. A.C.T. Lighting
   c. C.B.I. Professional Wiring Systems

6. Hardware
   a. City Theatrical

7. Theatrical Lighting Control Consoles and Peripherals
   a. Electronic Theatre Controls

B. State of the Art Development
1. The Contractor shall furnish only the manufacturers' latest developed appropriate products. In cases where product development from a specified manufacturer surpasses the criteria of this specification, the Contractor shall inform the Architect and make the newer product available to the Owner for acceptance. In no case shall discontinued or obsolete equipment be acceptable. Should a newer product be suggested as a substitution for a discontinued product, or for a product that is in process of being phased out of production, that newer product shall be offered to the Owner at no additional cost.

2. Should product recall by the Manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the Owner at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.

3. Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the job site.

4. Equipment defect or intended recall shall not relieve the Contractor from his contractual obligation with regard to delivery schedule of product. In this circumstance, notification shall be made to the Architect by express carrier. Arrangement for alternate product shall be made at this time.

5. Under no circumstances shall arrangement for alternate product necessarily require the Owner to accept superseded equipment except on a temporary basis.

C. Substitutions

1. All requests for variations from the specified materials and products will be reviewed by the Architect according to the procedures outlined in Division 01.

2. All requests for substitutions must be submitted in a timely manner, so as not to adversely impact the project schedule.

3. Substitutions will only be accepted if, in the opinion of the Architect, the product is an equal to the specified product. No substitutions may be made without written acceptance from the Architect. All substitutions made prior to this acceptance are at the sole risk of the Contractor.

4. A substitution must be a product of equal design, construction and performance. The Contractor must submit all pertinent information required to substantiate that the product is equal. The Contractor must submit all additional information, including test data, which may be requested in order for the Architect to fully evaluate the substitution. The burden of proof is solely on the Contractor.

5. All additional expenses of any kind with respect to substitution(s) shall be borne by the Contractor. This shall include, but not be limited to, all fees and expenses incurred by the Architect and other related Consultants for evaluation of the substitution and subsequent integration into the project should the substitution be taken and/or additional costs of other contractors related to the substitution(s).

2.2 MATERIALS

A. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable.

B. All mounting hardware shall be included.

1. All bolts and fasteners required to mount equipment to mounting hardware shall be Grade 5 or better.

C. Housings shall be sheet steel, cast aluminum or a combination of both, in thicknesses and gauges conforming to prevailing industry standards.
D. Fixtures shall be adequately ventilated for the largest lamp that the instrument is designed to accommodate. Vents shall be baffled to prevent emission of direct light from filament and reflector and to reduce to a minimum the stray light and secondary reflections.

E. Unless otherwise specified, reflectors shall be molded borosilicate reflector with multiple dichroic layers.

F. The exterior finish of all instruments shall be black high temperature epoxy paint. The interior finish in all instruments shall be flat black except for sockets and reflectors.

G. All lenses shall be heat-resistant, of size, type and spread specified.

H. All profile spotlights shall be provided with a positively locking means for adjusting the source to lens relationship to provide proper centering of the optical train.

I. All fixtures shall be supplied with lamps as specified, shipped to the job site (in their original packing) in clearly marked cartons, indicating lamp type, size and the space for which they are intended.

2.3 EQUIPMENT AND COMPONENTS

A. General
1. Provide Theatrical Lighting Fixtures described herein and in the attached Appendix.
2. Regardless of the length or completeness of the device descriptions herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Contractor may use either at his option. Equipment other than that listed shall not be substituted without specific written approval of the Theatre Consultant.
3. The Contractor shall provide complete, working systems regardless of the completeness of the Appendix equipment list.

2.4 ACCESSORIES

A. Provide accessories as described in the attached Appendix.

B. Each fixture to be supplied with:
1. Color frames of appropriate size
2. Power input cable
3. Clamp
4. Safety cable

2.5 STAGE CABLE

A. General
1. All stage extension cables shall be furnished with two 3” clear shrink wrap pieces, unshrunken, installed on cables for user labeling.
2. One shrink wrap piece shall be shrunk over a band of color at either end of the cable that shall identify the length of the cable. Alternate: shrink wrap shall be integral color as indicated.
3. Confirm color codes with Owner prior to fabrication.
B. Jumper Cables
1. All shall be Extra Hard usage cable utilizing NEMA or Neutrik PowerCON plugs as shown in the Appendix. Provide two affixed black sash cord ties.
2. Provide with 20A connectors and 12/3 SOW-A cable.
3. Provide quantities as shown in Appendix.

C. Two-fer Cables
1. All shall be 36” long, #12 AWG individual stranded cables in fiberglass sheaths or a 12/3 SO cord in a molded assembly with appropriate strain relief as approved.
2. Provide with connectors as shown in Appendix.
3. Provide quantities as shown in Appendix.

D. Multi-cable Extensions
1. Provide multi-cable extensions built from 75°C Extra Hard Usage cords, which consist of specified number of circuits rated 20 Amp at 125 Volts in accordance with Article 520 of the National Electrical Code
2. Multi-cable ends shall terminate in cylindrical male and female multi-pin connectors appropriately sized to mate with wiring devices as specified above.
3. Strain Relief:
   a. Provide Hubbell Kellem Heavy Duty, Single Eye, Closed Mesh strain relief on each multi-cable extension
4. Provide quantities as shown in Appendix.

E. Multi-cable “Fan-Out” Cables
1. Provide multi-pin to 20A connector “fan-out” cables of six 12/3 S or SO neoprene covered cables
2. Heavy-duty, locking multi-pin connector with clamping cable glands strain relief to mate with, and be of the same manufacture as, the multi-cable plug boxes
3. 20A connectors to be as listed in the Appendix
4. Male multi-pin to 20A female connector fan-outs:
   a. The cables shall be bundled to “fan-out” on 18” centers
   b. The first connector drop shall be 2’-0” from the multi-pin connector
   c. Connector drops shall be 18” long
5. Each 20A circuit shall have a discrete ground wire terminating in the multi-pin connector. The grounds may be common within the multi-pin connector.
6. Label connector drops with appropriate alphabetic circuit designations (“A” through “F”) keeping circuiting sequence identical through all multi-cables. All labels shall be affixed to the connector drops with shrink wrap tube. The “A” connector drop shall be closest to the multi-pin connector.
7. In addition to the alphabetic designations indicated above, securely attach blank white Plexiglas labels to 20A connectors. This surface shall allow the user to mark the circuit designation on the receptacle with china marker.
8. Provide quantities as shown in Appendix.

F. DMX Extension Cables
1. Provide DMX extension cables of ACT Tour-Plex Data-Sure or equal
2. 5-pin XLR connectors to mate with DMX nodes.
3. Provide quantities as shown in Appendix.

G. DMX Terminators
1. Provide In-Line DMX Terminator with status LED for end of line termination
2. Provide quantities as shown in Appendix.

H. Ethernet Extension Cables
1. Provide Ethernet Extension Cables of ACT Tour-Plex Tour-Net Cat5e or equal
2. RJ45 connectors to mate with Ethernet Taps.
3. Provide quantities as shown in Appendix.

2.6 SOURCE QUALITY CONTROL

A. All equipment and components shall be factory tested prior to shipping.

2.7 FABRICATION

A. Fabricate all work in this section in accordance with the Architect and General Contractor’s direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.

B. Machine finish all operating parts to standard trade tolerance, fits and finishes. Chicago, Illinois

PART 3 EXECUTION

3.1 CONTRACTORS

A. The equipment described herein shall be provided by a single Theatrical Lighting Fixtures and Accessories Contractor who will be responsible for furnishing all services described herein, including but not limited to coordination and supervision of the engineering, submittals and provision for all equipment specified herein.

B. Contractor shall provide the Warranty and Maintenance services specified herein.

C. 

THEATRICAL LIGHTING FIXTURES
D. Substitution Limitations
1. Any contractor who wishes to be listed and has not been pre-approved must submit qualification information to the Architect. Proposal shall include all of the information listed below:
   a. Statements of financial responsibility for the past five fiscal years showing assets and liabilities.
   b. List of principal officers and design and service engineers in an organizational structure flow chart.
   c. List of not less than 5 projects of similar size and scope completed within the five years on which contractor has provided full services: product engineering, shop drawings, manufacture, installation and commissioning. In each instance, indicate specifics of scope of fabrication and installation. Include a contact list: name, address and phone numbers of person(s) directly responsible for operation and maintenance of equipment in each facility.
   d. List of current projects and approximate contract value and completion dates. Include list of names, phone numbers and addresses of owner, owner's representatives and architect.
   e. For each above described project, list of names of persons who supervised preparation of shop drawings, manufacture of components, and installation of equipment.
   f. List of names of persons who would do project management, product engineering, supervision of shop drawing, supervision of installation should this contract be awarded.
   g. Contract Bond Company information indicating that Contractor has bonding capacity for full duration of project. Include list of other bonded projects coinciding with this project.
   h. Evidence of ability to undertake custom product engineering to meet specific requirements of project specifications. Provide sample project engineering drawings for custom products and contact information for facility operators where those products have been installed.

2. Standards of Acceptance:
   a. Refer to Paragraph 1.8B – Quality Assurance/Qualifications.

3.2 CLOSEOUT ACTIVITIES

A. Training
1. The Owner’s designated staff or representatives shall be instructed in the use, care and maintenance of all items.
2. Instruction must be by qualified expert operators who have actual experience with equipment in performance conditions.
3. Instruction to be scheduled in conformance with project construction schedules and the availability of the Owner.

B. Console Operator Instruction:
   1. Provide instruction to Owner or Owner’s selected key Lighting Control Console Operators on the detailed operation of Console. This training shall take place in two separate sessions. Each session shall be no less than four hours and shall take place on site.
   2. Timing for all sessions shall be scheduled by the Owner at their convenience.
   3. Instruction must be by qualified expert operators who have actual experience with systems in performance conditions.

3.3 ATTACHMENTS

A. Refer to Appendix A of this section for quantities and accessories.

END OF SECTION