

# REQUEST FOR PROPOSALS

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## MILLER OUTDOOR THEATRE RIGGING MAINTENANCE & UPGRADES



**HOUSTON FIRST CORPORATION**

# MILLER OUTDOOR THEATRE RIGGING MAINTENANCE & UPGRADES

ISSUE DATE: August 7, 2015

DUE DATE: **11:00 a.m.** on **September 1, 2015** (“Submission Deadline”)

INSTRUCTIONS: Proposers must submit seven (7) paper copies of their Proposal and one (1) electronic copy of their Proposal on a flash drive in a sealed envelope in person, via mail or courier. **Please write the Proposer’s name, phone number and email address on the outside of the sealed envelope.**

SUBMIT TO: Lisa Hargrove, General Counsel, Houston First Corporation (“HFC”), 1331 Lamar Street, Suite 700, Houston, TX 77002.

CONTACT INFO: Questions concerning this RFP must be sent to [bids@houstonfirst.com](mailto:bids@houstonfirst.com) no later than **10:00 a.m.** on **August 26, 2015**. Questions will be answered collectively, in the form of a Letter of Clarification, and made available online.

## PURPOSE & OVERVIEW

Houston First Corporation (“HFC”) requests responsive proposals (“Proposals”) from highly-qualified stage rigging equipment integrators (“Proposers”) to provide the removal, replacement and updating of the current rigging system, rigging upgrades installation of a motorized variable speed front of house curtain and installation of motor assists for all electrics, and equipment in the Miller Outdoor Theatre in Houston, Texas in accordance with the following.

HFC is a local government corporation created by the City of Houston to facilitate economic growth through the promotion of the greater Houston area and the business of conventions, meetings, tourism, and the arts. HFC manages and operates more than 10 city-owned facilities, including the George R. Brown Convention Center, Gus S. Wortham Theater Center, Jesse H. Jones Hall for the Performing Arts, and Miller Outdoor Theatre. HFC is the entity responsible for marketing Houston and increasing awareness of its many attractions and amenities.

Miller Outdoor Theatre is unique in the United States, offering an 8-month season of performances that are artistically excellent, culturally diverse and free of charge to the public. Named after mining engineer and cotton broker Jessie Wright Miller (1875-1919), the theatre is located on a prime 7.5-acre tract in Hermann Park, within walking distance of the Museum of Natural Science and Houston Zoo.

Use of the site as a performing arts venue dates to May 12, 1922, when the original structure was dedicated. In 1964, Houston voters approved certain capital improvement bonds to replace the outdated venue with a state-of-the-art theatre. Four years later, the new-and-improved Miller Outdoor Theatre debuted with a Labor Day weekend concert by the Houston Symphony. In the ensuing years, the theatre has undergone three major renovations to maintain the facility and enhance the experience of patrons and performers

The existing theatre structure features a 64’ x 41’ foot stage, 54 line sets for rigging, curtains and scenery, an orchestra pit which can be raised and lowered, dressing rooms, offices, a full complement of theatrical equipment, and a 110-ton air conditioning system to cool the performance area. Seating is available for 1,705 patrons and 20 wheelchair spaces; the hill behind the main seating area can accommodate approximately 4,500 more on blankets or lawn chairs.

## PRE-PROPOSAL CONFERENCE AND WALKTHROUGH

A pre-proposal conference and walkthrough will be held for the benefit of all prospective Proposers at **10:00 a.m.** on **August 20, 2015** at Miller Outdoor Theatre, located at 6000 Herman Park Dr., Houston, Texas 77030. Although attendance is not mandatory, all prospective Proposers are urged to be present.

## RFP PACKETS

A complete copy of this RFP, including all forms, as well as the Agreement and its exhibits, is available on-line at: [www.houstonfirst.com/DoBusiness.aspx](http://www.houstonfirst.com/DoBusiness.aspx).

## LETTERS OF CLARIFICATION

Revisions incorporated into this RFP, if any, will be confirmed in a letter posted online at least 24 hours prior to the Submission Deadline at [www.houstonfirst.com/DoBusiness.aspx](http://www.houstonfirst.com/DoBusiness.aspx) ("Letter of Clarification"). When issued by HFC, Letters of Clarification become part of this RFP automatically and supersede any previous specifications or provisions in conflict therewith. By submitting a Proposal, Proposers shall be deemed to have received all Letters of Clarification and to have incorporated them into their Proposal. Verbal responses will not otherwise alter the specifications, terms and conditions as stated herein. It is the responsibility of Proposers to monitor the foregoing link and ensure they receive any such Letters of Clarification.

## ELIGIBILITY AND RESPONSE FORMAT

Although HFC prefers substance over form, to be considered responsive, Proposers should review the following criteria/information requests and respond, in order, to the best of their ability:

- a. **Transmittal Letter:** Include a brief cover letter signed by a person authorized to make representations on behalf of the Proposer, including his or her direct phone number and email address. Proposers **must** make a specific, clear, unambiguous statement accepting and agreeing to comply with the Contract and Terms & Conditions portion of this Proposal or identify any objections/exceptions and enclose as such exceptions immediately following the letter. Be advised that proposals including material exceptions will be rejected without further consideration.
- b. **Experience & Reputation:** Briefly discuss Proposer's specific experience, both previous and current, completing stage rigging projects at comparable facilities. To be considered responsive, Proposers **must** have completed at least seven such projects in the last three years. Provide at least three references, including contact names, phone numbers, and a brief description of the work completed by Proposer. Indicate availability for the Project dates and disclose any other projects Proposer intends to undertake during such timeframe.
- c. **Key Personnel:** Identify the proposed Project Manager any essential personnel who would be assigned to provide services for HFC; include a brief summary of their qualifications.
- d. **Pricing Form:** Complete the Pricing Form provided at the end of the RFP. Do **not** alter the official form. Submission or attachment of company quotation forms or other documents containing alternative or conflicting terms is not acceptable. The Pricing Form must be the last page of the Proposal as submitted.
- e. **Overall Responsiveness:** The conciseness and clarity of every Proposal will be evaluated (there is no page limit).

## MANNER OF SELECTION

HFC intends to make a selection and enter into a contract with the best-qualified Proposer during based on merit and qualifications. The factors HFC will consider are: Experience and reputation (40%); Key personnel (25%); Acceptance of contract and terms (15%); Proposed pricing (15%); and Overall responsiveness and organization (5%).

HFC expects to announce its selection on or about September 22, 2015.

HFC reserves the right to select or reject all or part of any proposal, waive minor technicalities, and select proposals in the manner and to the extent that they serve the best interests of HFC. This RFP does not commit HFC to award a contract, issue a purchase order, or to pay any costs incurred in the preparation of a proposal in response to this RFP. HFC reserves the right to schedule oral interviews, request clarifications/additional

information, and solicit best-and-final offers from one or more Proposers prior to making a final selection.

### **FORM OF AGREEMENT**

By submitting a response to this RFP, Proposer agrees, upon notice of selection, to enter into a contract with HFC which shall include the Contract and Term & Conditions set forth below. Preprinted or standard terms submitted by a Proposer shall not be included in the resulting agreement.

### **RESTRICTIONS ON COMMUNICATIONS**

From the date issued until the Submission Deadline, Proposers are directed not to communicate with HFC officers, directors or employees regarding any matter relating to this Proposal, other than through [bids@houstonfirst.com](mailto:bids@houstonfirst.com) and HFC representatives during the pre-submittal conference. HFC reserves the right to reject any Proposal due to violation of this provision.

### **COLLUSION**

Proposers represent that the contents of their Proposals have not been communicated, directly or indirectly, to any potential Proposer and that their submissions are made in compliance with federal and state antitrust laws without previous understanding, agreement or connection with any competitor or other potential Proposer; this restriction is not, however, intended to preclude preliminary negotiations with diversity subcontractors.

### **CONFLICT OF INTEREST**

Proposers are required to disclose affiliations or business relationship that might cause a conflict of interest with HFC. The disclosure form, if required, is available online at: <http://www.ethics.state.tx.us/forms/CIQ.pdf>. By submitting a Proposal, Proposers represent that they are in compliance with the requirements of Chapter 176 of the Texas Local Government Code.

### **PUBLIC INFORMATION**

HFC is subject to the Texas Public Information Act ("TPIA"). Information submitted by Proposers is subject to release under the provisions of the TPIA set forth in Chapter 552 of the Texas Government Code. Each page where confidential/proprietary information appears must be labeled as such by Proposers clearly. Proposers will be advised of any request for public information that implicates their materials and will have the opportunity to raise objections to disclosure with the Texas Attorney General at their expense.

### **WITHDRAWAL OF PROPOSAL; ERRORS**

To withdraw a Proposal due to an error or any other reason, a written request from the Proposer must be received at [bids@houstonfirst.com](mailto:bids@houstonfirst.com) prior to the Submission Deadline.

## CONTRACT

By submitting a proposal, the Proposer agrees to incorporate all of the following standard contract terms as part of any agreement with HFC arising out of the Project.

This Miller Outdoor Theatre Rigging Maintenance and Upgrades agreement (“Agreement”) is made by and between Houston First Corporation (“HFC”), a local government corporation created under Chapter 431 of the Texas Transportation Code, whose address for the purposes of this agreement is 1001 Avenida de las Americas, Houston, Texas 77010 and [TBD] (“Contractor”), whose address is [TBD]. In consideration of the mutual promises contained herein, the parties hereby agree as follows:

### 1.0 Project

1.1 Contractor agrees to and shall complete the Project in strict accordance with this Agreement, including the Terms & Conditions, Specifications and Drawings.

1.2 The name of this project is the **Miller Outdoor Theatre Rigging Maintenance & Upgrades** (“Project”). The location of the Project is Miller Outdoor Theatre, having a street address of 6000 Herman Park, Dr., Houston, Texas 77030 (“Facility” or “Project Site”). The Facility is owned by the City of Houston, Texas and subject to a long-term lease to HFC.

1.3 Contractor agrees to and shall commence work on **November 23, 2015** and achieve Final Completion (as defined in the Terms & Conditions) no later **February 26, 2016** (“Contract Time”), subject to adjustments, if any, in accordance with the Terms & Conditions.

**1.4 CONTRACTOR AND HFC ACKNOWLEDGE AND AGREE THAT THE PROJECT AND ALL WORK RELATED THERETO CONSTITUTE AND SHALL BE CONSIDERED TO BE A PUBLIC WORKS PROJECT OF A MUNICIPALITY FOR ALL PURPOSES, INCLUDING CHAPTER 151 OF THE TEXAS INSURANCE CODE.**

### 2.0 Payment

2.1 Subject to the terms, conditions and restrictions herein, HFC agrees to pay Contractor [TBD] (“Contract Sum”), itemized as follows: [TBD]

2.2 No more than once every 30 calendar days, Contractor may request a progress payment from HFC based on the quantity of work completed. HFC may approve, deny, or adjust such request in its sole, but reasonable discretion; in no event, however, shall HFC pay Contractor more than **90%** of the Contract Sum prior to Final Completion of the Project and approval by HFC.

### 3.0 Insurance

3.1 Contractor shall provide and maintain in full force and effect from the date of execution of the agreement until Final Completion of the Work, including all extensions and amendments thereto, at least the following insurance and available limits of liability:

Commercial General Liability, including Contractor’s Protective, Broad Form Property Damage, Contractual Liability, Explosion, Underground and Collapse, Bodily Injury, Personal Injury, Products and Completed Operations	Combined single limit of \$1,000,000 per occurrence, subject to a general aggregate of \$2,000,000; Products and Completed Operations \$1,000,000 aggregate
Automobile Liability Insurance	\$1,000,000 combined single limit including Owned, Hired, and Non-Owned and Auto Coverage
Workers' Compensation	Statutory for Workers' Compensation. Contractor is not allowed to self-insure Workers' Compensation
Employer's Liability	Bodily Injury by accident \$1,000,000 (each accident) Bodily Injury by Disease \$1,000,000 (policy limit) Bodily Injury by Disease \$1,000,000 (each employee)
Owner’s and Contractor’s Protective Liability	\$1,000,000 combined single limit
Excess Coverage	\$1,000,000 each Occurrence/combined aggregate in excess of limits specified for Employer’s Liability,

3.2 Insurance may be in one or more policies of insurance, form of which is subject to approval by HFC. It is agreed, however, that nothing HFC does or fails to do with regard to insurance policies relieves Contractor from its duties to provide required coverage and HFC's actions or inactions will never be construed as waiving HFC's rights.

3.3 The issuer of any policy shall have a Certificate of Authority to transact insurance business in Texas or shall be an eligible non-admitted insurer in the State of Texas and have an A.M. Best rating of at least A- with a financial size category of Class VI or better.

3.4 Each policy, except those for Workers' Compensation and Owner's and Contractor's Protective Liability, must include an endorsement naming HFC, the City of Houston and Miller Outdoor Theatre Advisory Board, Inc. as additional insureds.

3.5 Each policy except Owner's and Contractor's Protective Liability must contain endorsement to the effect that issuer waives any claim or right in nature of subrogation to recover against HFC, the City of Houston, or Miller Theatre Advisory Board, Inc.

3.6 Each policy, except Workers' Compensation policies, must contain an endorsement that the policy is primary insurance to any other insurance available to the additional insureds with respect to claims arising hereunder.

3.7 Contractor is solely responsible for payment of all insurance premium requirements.

3.8 Contractor shall require subcontractors with whom it contracts directly, whose subcontracts exceed \$50,000, to provide proof of Commercial General Liability, Workers' Compensation, and Employer's Liability coverage that meets all the requirements of section; provided, however, that the amount must be commensurate with the amount of the subcontract, but not less than \$1,000,000 per occurrence.

#### **4.0 Limitation of Liability**

4.1 To the extent permitted by law, in no event shall HFC be liable to Contractor for any lost revenues, lost profits, incidental, indirect, consequential, special, or punitive damages. HFC's liability to Contractor shall under no circumstances exceed the total amount of fees actually paid by HFC to Contractor in connection with the contract between the parties.

#### **5.0 Release**

**5.1 CONTRACTOR AGREES TO AND SHALL RELEASE HOUSTON FIRST CORPORATION, THE CITY OF HOUSTON, MILLER THEATRE ADVISORY BOARD, INC., INCLUDING THEIR EMPLOYEES, AGENTS, OFFICERS, AND DIRECTORS (COLLECTIVELY, "INDEMNITEES") FROM ALL LIABILITY FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THIS CONTRACT, EVEN IF THE INJURY, DEATH, DAMAGE, OR LOSS IS CAUSED BY THE INDEMNITEES' CONCURRENT NEGLIGENCE AND/OR THE INDEMNITEES' STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY AS WELL AS FROM ALL LIABILITY FOR DAMAGES OR OTHER RELIEF ARISING UNDER FEDERAL OR STATE EMPLOYMENT LAWS RELATING TO OR INVOLVING PERSONNEL EMPLOYED BY CONTRACTOR UNDER THE CONTRACT.**

#### **6.0 Indemnification**

**6.1 CONTRACTOR AGREES TO AND SHALL DEFEND, INDEMNIFY, AND HOLD HOUSTON FIRST CORPORATION, THE CITY OF HOUSTON, MILLER THEATRE ADVISORY BOARD, INC., INCLUDING THEIR EMPLOYEES, AGENTS, OFFICERS, AND DIRECTORS (COLLECTIVELY, "INDEMNITEES") HARMLESS FOR ALL CLAIMS, CAUSES OF ACTION, LIABILITIES, FINES, AND EXPENSES (INCLUDING, WITHOUT LIMITATION, COPYRIGHT INFRINGEMENT, ATTORNEY'S FEES, COURT COSTS, AND ALL OTHER DEFENSE COSTS AND INTEREST) FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THIS AGREEMENT, INCLUDING, WITHOUT LIMITATION, THOSE CAUSED BY OR RELATING TO: CONTRACTOR AND/OR ITS AGENTS', EMPLOYEES', OFFICERS', DIRECTORS', CONTRACTORS', OR SUBCONTRACTORS' (COLLECTIVELY, "CONTRACTOR") ACTUAL OR ALLEGED NEGLIGENCE OR INTENTIONAL ACTS OR OMISSIONS; INDEMNITEES' AND CONTRACTOR'S ACTUAL OR ALLEGED CONCURRENT NEGLIGENCE, WHETHER CONTRACTOR IS IMMUNE FROM LIABILITY OR NOT; INDEMNITEES' AND CONTRACTOR'S ACTUAL OR ALLEGED STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY, WHETHER CONTRACTOR IS IMMUNE FROM LIABILITY OR NOT; AND ACTUAL OR ALLEGED VIOLATIONS OF ANY FEDERAL OR STATE EMPLOYMENT LAWS, INCLUDING WITHOUT LIMITATION, ALL CLAIMS AND CAUSES OF ACTION BROUGHT AGAINST INDEMNITEES BY CONTRACTOR'S PERSONNEL**



**AND/OR GOVERNMENT AGENCIES ARISING FROM, RELATING TO, OR INVOLVING SERVICES OF CONTRACTOR'S PERSONNEL UNDER THE CONTRACT.**

**6.2 CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE INDEMNITEES HARMLESS FROM THE EFFECTIVE DATE UNTIL FOUR YEARS AFTER THE FINAL COMPLETION OF THE PROJECT. CONTRACTOR SHALL NOT INDEMNIFY THE INDEMNITEES FOR THEIR SOLE NEGLIGENCE. CONTRACTOR SHALL REQUIRE ALL OF ITS CONTRACTORS AND SUBCONTRACTORS TO RELEASE AND INDEMNIFY THE INDEMNITEES TO THE SAME EXTENT AND IN SUBSTANTIALLY THE SAME FORM AS ITS RELEASE AND INDEMNITY TO THE INDEMNITEES.**

**7.0 Indemnification Procedures**

7.1 If HFC or Contractor receives notice of any claim or circumstances, which could give rise to an indemnified loss, the receiving party shall give written notice to the other party within 30 days. The notice must include the following (1) a description of the indemnification event in reasonable detail, (2) the basis on which indemnification may be due, and (3) the anticipated amount of the indemnified loss.

7.2 This notice does not stop or prevent HFC from later asserting a different basis for indemnification or a different amount of indemnified loss than that indicated in the initial notice. If HFC does not provide this notice within the 30 day period, it does not waive any right to indemnification except to the extent that Contractor is prejudiced, suffers loss, or incurs expense because of the delay.

7.3 Contractor may assume the defense of the claim at its own expense with counsel chosen by it that is reasonably satisfactory to HFC. Contractor shall then control the defense and any negotiations to settle the claim. Within ten days after receiving written notice of the indemnification request, Contractor must advise HFC as to whether or not it will defend the claim. If Contractor does not assume the defense, HFC may assume and control the defense, and all defense expenses constitute an indemnification loss.

7.4 If Contractor elects to defend the claim, HFC may retain separate counsel to participate in (but not control) the defense and to participate in (but not control) any settlement negotiations. Contractor may settle the claim without the consent or agreement of HFC, unless it (i) would result in injunctive relief or other equitable remedies or otherwise require the Indemnitees to comply with restrictions or limitations that adversely affect the Indemnitees, (ii) would require the Indemnitees to pay amounts that Contractor does not fund in full, (iii) would not result in the Indemnitees' full and complete release from all liability to the plaintiffs or claimants who are parties to or otherwise bound by the settlement.

**8.0 Ownership of Intellectual Property**

8.1 In the event that the work and material which is the subject of this contract is copyrightable subject matter, HFC and Contractor hereby agree that for the purpose of this Contract the work and material shall be a work-made-for-hire and the property of HFC. In the event that the work and material which is the subject of this contract is not copyrightable subject matter, or for any reason is determined not to be a work-made-for-hire, then Contractor hereby grants all right, title and interest to said work and material to HFC, and Contractor will promptly execute and deliver such documents as may be requested by HFC, in order to accomplish the transfer of all such right, title and interest.

**9.0 Warranties**

9.1 Contractor warrants that it shall perform all work in a good and workmanlike manner, meeting the standards of quality prevailing in Harris County, Texas for work of this kind. Contractor shall perform all work using trained and skilled persons having substantial experience performing the work required under this Contract as more fully described herein.

9.2 With respect to any parts and goods it furnishes, Contractor warrants: (a) that all items are free of defects in title, design, material, and workmanship, (b) that each item meets or exceeds the manufacturer's specifications and requirements for the equipment, structure, or other improvement in which the item is installed, (c) that each replacement item is new, in accordance with original equipment manufacturer's specifications, and of a quality at least as good as the quality of the item which it replaces (when the replaced item was new), and will not cause any manufacturer's warranties to lapse or become invalid, and (d) that no item or its use infringes any patent, copyright, or proprietary right.

9.3 Work, materials, or equipment not conforming to the requirements of this Section shall be deemed defective and repaired or replaced at HFC's sole option by Contractor, at no cost to HFC. If required by HFC, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

9.4 Contractor hereby transfers and assigns to HFC all manufacturer's warranties for materials used in connection with this Project and shall complete and execute all forms required to further evidence such transfer and assignment. The

parties agree that no warranty made by Contractor under the Contract Documents is intended to limit, nor shall it be construed as limiting in any manner or to any extent, any manufacturer's or supplier's warranty. Upon request from HFC, Contractor agrees to provide reasonable assistance in enforcing such warranties against the manufacturer or supplier at no additional cost to HFC.

## **10. Work Conditions and Restrictions**

10.1 All work performed by the Contractor shall be in accordance with applicable City of Houston building and electrical codes. Any electricians employed by Contractor and its subcontractors shall hold a valid license issued by the Texas Department of Licensing and Regulation. The manner and extent to which Contractor may use common areas of the Facility, such as entrances, shall be determined by HFC in its sole discretion. Contractor shall protect all areas and equipment when working in the Facility. Caution warning signs shall be placed near any slippery or wet surfaces. Contractor shall be responsible for the cost of repairing any damage to the Facility caused by the negligence of Contractor, its subcontractors or agents. Damage, as used in this Section, shall not include normal wear and tear. Repairs and replacements of such items and finishes may be deducted from Contractor's fees. Contractor shall on a daily basis or as requested, clean the work sites and any adjacent areas affected by the Project. Contractor shall store materials only in storage areas designated by HFC. Contractor is solely responsible for any necessary permits to complete the work.

## **11.0 Safety**

11.1 Contractor represents and warrants that services performed by Contractor shall conform to the standards declared by OSHA, including, but not limited to, compliance with federal and state safety standards/directives for setting-up and utilizing platforms, lifts, ladders, scaffolding, safety lines and belts, and similar equipment used for demolition and construction.

11.2 Contractor's employees, agents, contractors and subcontractors shall use personal protective equipment, safety harnesses, fall protection equipment, hard hats or other equipment required to perform the work in safe manner. Contractor will hold safety training, safety briefings or other meetings to ensure all staff are fully prepared to perform the work with safety in mind. Contractor shall conduct daily safety and health inspections of the work site. Contractor shall promptly report any accidents, injuries, spills, or near misses to HFC.

## **12.0 Prevailing Wage Requirement**

12.1 Contractor shall comply with governing statutes providing for labor classification of wage scales for each craft or type of laborer, worker, or mechanic. Prevailing wage rates applicable to the work may be one or a combination of the following wage rates identified at [www.houstonfirst.com/DoBusiness.aspx](http://www.houstonfirst.com/DoBusiness.aspx), which is incorporated herein for all purposes by this reference. Contractor warrants and represents that it has carefully examined the classifications for each craft or type of worker needed to execute the work and determined that such classifications include all necessary categories to perform the work.

12.2 If Contractor believes that an additional classification for a particular craft or type of worker is necessary to perform work under the Contract, it must submit such request to HFC to use an additional labor classification not listed therein and specify the proposed new classification. If HFC decides that a new classification is necessary, it will determine the appropriate prevailing wage rate for any resurveyed, amended, new, or additional craft or type of worker not covered. Such determination will be made by HFC in compliance with applicable law. Each month, Contractor shall submit directly to the HFC project manager certified copies of payrolls showing classifications and wages paid by Contractor, subcontractors, and suppliers for each employee under the Contract, for any day included in the Contract.

## **13.0 Termination**

13.1 If Contractor defaults under the Contract, HFC may either terminate the Contract or allow Contractor to cure the default as provided below. HFC's right to terminate the Contract for Contractor's default is cumulative of all rights and remedies, which exist now or in the future. Default by Contractor occurs if: (a) Contractor fails to perform any of its duties under the Contract, (b) Contractor becomes insolvent, (c) all or a substantial part of Contractor's assets are assigned for the benefit of its creditors, or (d) a receiver or trustee is appointed for Contractor.

13.2 If a default occurs, HFC may, but is not obligated to, deliver a written notice to Contractor describing the default and the termination date. HFC, in its sole discretion, may extend the termination date to a later date. If HFC allows Contractor to cure the default and Contractor does so to the satisfaction of HFC before the termination date, then the termination is ineffective. If Contractor does not cure the default before the termination date, then HFC may terminate the contract on the termination date, at no further obligation of HFC. To effect final termination, HFC must notify Contractor in writing. After receiving the notice, Contractor shall, unless the notice directs otherwise, immediately discontinue all services under the Contract, and promptly cancel all orders or subcontracts chargeable to the Contract.

13.3 HFC may terminate the Contract at any time by giving 30 days' written notice to Contractor. HFC's right to terminate



the Contract for convenience is cumulative of all rights and remedies, which exist now or in the future. On receiving such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue all services under the Contract and cancel all existing orders and subcontracts that are chargeable to the Contract. As soon as practicable after receiving the termination notice, Contractor shall submit an invoice showing in detail the services performed under the Contract up to the termination date. HFC shall then pay the fees to Contractor for services actually performed, but not already paid for.

#### **14.0 Force Majeure**

14.1 Timely performance by both parties is essential to this Agreement. However, neither party will be liable for delays or other failures to perform under this Agreement to the extent the delay or failure is caused by an occurrence of Force Majeure. For purposes of this Agreement, "Force Majeure" shall mean fires, floods, explosions, war, terrorism, riots, and the acts of superior governmental or military authority. This relief is not applicable unless the affected party uses due diligence to remove the Force Majeure as quickly as possible and provides the other party with written notice describing the actual delay or non-performance incurred within 10 calendar days after the Force Majeure ceases.

#### **15.0 Miscellaneous.**

15.1 Inspections and Audits. Upon reasonable notice, either party shall have the right to examine and review the other party's books, records and billing documents which are directly related to performance or payment under this Agreement. Nothing in this Section shall affect the time for bringing a cause of action or the applicable statute of limitations.

15.2 Notices. Notices to either party to the Agreement must be in writing and must be delivered by hand, United States registered or certified mail, return receipt (or electronic return receipt) requested, Federal Express, UPS or any other national overnight express delivery service. The notice must be addressed to the party to whom the notice is given at its address set out in this Agreement or other address the receiving party has designated previously by proper notice to the sending party. Postage or delivery charges must be paid by the party giving the notice.

15.3 Independent Contractors. HFC and Contractor agree that they do not intend to form, and this Agreement shall not be construed as creating, a partnership or joint venture under any circumstances. Neither party hereto shall have any authority, in any manner or to any extent, to bind the other party. With respect to each other, the parties shall be independent contractors for all purposes.

15.4 Non-Waiver. Failure of either party hereto to insist on the strict performance of any of the agreements herein or to exercise any rights or remedies accruing hereunder upon default or failure of performance shall not be considered a waiver of the right to insist on and to enforce by any appropriate remedy, strict compliance with any other obligation hereunder or to exercise any right or remedy occurring as a result of any future default or failure of performance.

15.5 Assignment and Severability. Contractor shall not assign this Agreement in whole or in part without the prior written consent of HFC. If any part of this Agreement is for any reason found to be unenforceable, all other parts remain enforceable unless the result materially prejudices either party.

15.6 Survival. The parties shall remain obligated to each other under all clauses of this Agreement that expressly or by their nature extend beyond the expiration or termination of the Term.

15.7 Governing Law/Venue. The Contract shall be governed by the laws of the State of Texas, without regard to any conflict of law provisions. Litigation in connection with this Contract shall be in a court of competent jurisdiction in Harris County, Texas.

15.8 Entire Agreement. This Agreement, including the Terms & Conditions and Specifications, represents the entire and integrated agreement between HFC and Contractor and supersedes all prior negotiations, representations or agreements either written or oral. This Agreement may not be altered or amended except in writing executed on behalf of all of the parties.

15.9 Authority to Sign. The signer of this Agreement hereby represents and warrants that he or she has full authority to execute this Agreement and bind Contractor.

This Contract shall be executed in duplicate, each of which shall be considered an original, to be effective on the date of countersignature by HFC.

[Not for Signature]

## **TERMS & CONDITIONS**

### **ARTICLE 1: GENERAL PROVISIONS**

1.1 The Contract Documents form the contract. The term "Contract Documents" consists of the Agreement, Terms & Conditions, and Specifications.

1.2 The Contract Documents represent the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than HFC and Contractor.

1.3 Contractor shall perform the Work in strict accordance with the Contract Documents. In the event of a conflict between the Agreement, Terms & Conditions, and Specifications, the following order shall control: (1) Agreement; (2) Terms & Conditions; (3) Specifications.

1.4 The term "Work" means the equipment and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by Contractor to fulfill Contractor's obligations. The Work may constitute the whole or a part of the Project.

1.5 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by Contractor. The Contract Documents are complementary, and what is required by one shall be as binding upon Contractor as if required by all.

### **ARTICLE 2: HFC**

2.1 No employee or agent of HFC has the authority to authorize Contractor to perform an act or work contrary to the Contract Documents.

2.2 HFC shall furnish information or services required of HFC by the Contract Documents with reasonable promptness. HFC shall also furnish any other information or services under HFC's control and relevant to Contractor's performance of the Work with reasonable promptness after receiving Contractor's written request for such information or services.

2.3 HFC is exempt from payment of Federal Excise and Transportation Tax and Texas Limited Sales and Use Tax. Contractor's invoices to HFC must not contain assessments of any of these taxes. HFC will furnish HFC's exemption certificate and federal tax identification number to Contractor if requested.

### **ARTICLE 3: CONTRACTOR**

3.1 Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. Contractor shall designate a representative who shall have express authority to bind Contractor with respect to all matters under the Contract Documents. The term "Contractor" means Contractor or Contractor's authorized representative.

3.2 Execution of the Agreement by Contractor is a representation that Contractor has visited the Project Site, become familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

3.3 Because the Contract Documents are complementary, Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. Contractor shall promptly report to HFC any errors, inconsistencies or omissions discovered by or made known to Contractor as a request for information in such form as HFC may require.

3.4 Contractor shall promptly report to HFC any nonconformity discovered in the Contract Documents with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities as a request for information in such form as HFC may require.

3.5 Contractor shall supervise and direct the Work, using Contractor's best skill and attention. Contractor shall be solely responsible for, and have control over, means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract Documents, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning means, methods, techniques,

sequences or procedures, Contractor shall evaluate the jobsite safety thereof and shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.

3.6 Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

3.7 Contractor shall provide and pay for labor, materials, equipment, tools, equipment, machinery, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

3.8 Contractor may make substitutions only with the consent of HFC, after evaluation by HFC and in accordance with a Change Order.

3.9 Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Work. Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.10 Contractor shall pay before delinquent all sales, consumer, use and other taxes for the Work provided by Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

3.11 Unless otherwise provided in the Contract Documents, Contractor shall secure and pay for permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are legally required at the time bids are received or negotiations concluded.

3.12 Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

3.13 If Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, then Contractor shall assume be liable for such Work and shall bear the costs attributable to correction.

3.14 Contractor shall confine operations at the Project site to areas designated by HFC and as permitted under applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the Project site with materials or equipment.

3.15 Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

3.16 Contractor shall not damage or endanger a portion of the Work or fully or partially completed work of HFC or separate contractors by cutting, patching or otherwise altering such construction. Contractor shall not cut or otherwise alter such work by HFC or a separate contractor except with written consent of HFC and of such separate contractor; such consent shall not be unreasonably withheld. Contractor shall not unreasonably withhold from HFC or a separate contractor Contractor's consent to cutting or otherwise altering the Work.

3.17 Contractor shall keep the Project Site free from accumulation of waste materials or rubbish caused by operations under the Contract Documents. At completion of the Work, Contractor shall remove waste materials, rubbish, Contractor's tools, equipment, machinery, and surplus materials from and about the Project Site. If Contractor fails to clean up as provided in the Contract Documents, then HFC may do so and HFC shall be entitled to reimbursement from Contractor.

#### **ARTICLE 4: CHANGES IN THE WORK**

4.1 Changes in the Work may be accomplished after execution of the Agreement, and without invalidating the Contract Documents, by Change Order, subject to the limitations stated in this Article and elsewhere in the Contract Documents.

4.2 A Change Order is a written instrument prepared by HFC and signed by HFC and Contractor stating their agreement upon all of the following: (i) the change in the Work; (ii) the amount of the adjustment, if any, in the Contract Sum; and (iii) the extent of the adjustment, if any, in the Contract Time.

4.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and Contractor shall proceed promptly, unless otherwise provided in the Change Order.

4.4 In no event shall the aggregate amount of Change Orders and Change Directives under this Agreement exceed **five percent (5%)** of the Contract Sum.

#### **ARTICLE 5: PARTIAL OCCUPANCY AND FINAL COMPLETION**

5.1 HFC may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with Contractor, provided such occupancy or use is authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is complete, provided HFC and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents.

5.2 When Contractor considers a portion complete, Contractor shall prepare and submit a comprehensive list of items to be completed or corrected prior to completion; provided, however, that failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Consent of Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between HFC and Contractor.

5.3 Immediately prior to such partial occupancy or use, HFC and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

5.4 Upon receipt of Contractor's written notice that the Work is ready for final inspection and acceptance, HFC or its representative will promptly make such inspection and, if the Work is found to be acceptable under the Contract Documents and fully performed, issue a written statement that the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due Contractor is due and payable. The date such written statement is issued by HFC shall be the date of Final Completion for purposes of the Contract Documents.

5.5 Neither final payment nor any remaining retained percentage shall become due until Contractor submits five true and correct copies of operation and maintenance manuals for all equipment and systems to HFC and HFC receives (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which HFC or HFC's property might be responsible or encumbered (less amounts withheld by HFC) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 calendar days' prior written notice has been given to HFC, (3) a written statement that Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by HFC, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract Documents, to the extent and in such form as may be designated by HFC. If a subcontractor refuses to furnish a release or waiver required by HFC, then Contractor may furnish a bond satisfactory to HFC to indemnify HFC against such lien. If such lien remains unsatisfied after payments are made, then Contractor shall refund to HFC all money that HFC may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

#### **ARTICLE 6: UNCOVERING AND CORRECTION OF WORK**

6.1 In addition to Contractor's obligations under Article 3, if, within five years after the date of Completion of the Work, any of the Work is found to be not in accordance with the requirements of the Contract Documents, then Contractor shall correct it within 30 calendar days after receipt of written notice from HFC to do so at no cost to HFC; provided, however, that the warranty period for goods, materials and equipment shall be equal to five years after the date of Completion of the Work or the manufacturer's warranty, whichever is greater.

6.2 The five-year period for correction of Work shall be extended with respect to portions of Work first performed after Completion by the period of time between Completion and the actual completion of that portion of the Work.

6.3 The five-year period for correction of Work shall not be extended by corrective Work performed by Contractor pursuant to this Article.

6.4 Contractor shall remove from the Project Site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by HFC.

6.5 Contractor shall be liable for the cost of correcting destroyed or damaged construction, whether completed or partially completed, of HFC or separate contractors caused by Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

6.6 Nothing contained in this Article shall be construed to establish a period of limitation with respect to other obligations Contractor has under the Contract Documents. Establishment of the period for correction of Work as described herein relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than specifically to correct the Work.

6.7 If HFC prefers to accept Work that is not in accordance with the requirements of the Contract Documents, then HFC may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable, as determined by HFC in its reasonable discretion. Such adjustment shall be effected whether or not final payment has been made.

#### **ARTICLE 7: TIME**

7.1 Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for completion of the Work.

7.2 The date of commencement of the Work is the Effective Date established in the Agreement.

7.3 Time limits stated in the Contract Documents are of the essence. By executing the Agreement, Contractor acknowledges and agrees that the Contract Time is a reasonable period for undertaking and completing the Work in accordance with the Contract Documents.

7.4 Contractor shall not commence operations on the site or elsewhere prior to the effective date of insurance required hereunder to be furnished by Contractor.

7.5 Contractor represents that it shall proceed expeditiously with adequate forces and shall achieve completion of the Work within the Contract Time.

#### **ARTICLE 8: BONDS**

8.1 Contractor shall provide performance and payment bonds for 100% of the Contract Sum on a form approved by HFC covering faithful performance of the Work and payment of obligations arising thereunder as required in the Contract Documents pursuant to Chapter 2253 of the Texas Government Code. The cost of such bonds is included in Contract Sum.

8.2 A bond that is given or tendered to HFC pursuant to the Contract Documents must be executed by a surety company that is authorized and admitted to write surety bonds in the State of Texas.

8.3 If the amount of a bond is greater than \$100,000, then surety shall: (i) hold certificate of authority from the United States Secretary of Treasury to qualify as surety on obligations permitted or required under federal law; or, (ii) obtain reinsurance for any liability in excess of \$100,000 from a reinsurer that is authorized and admitted as a reinsurer in the State of Texas and holder of a certificate of authority from the United States Secretary of the Treasury to qualify as surety or reinsurer on obligations permitted or required under federal law.

8.4 Determination of whether surety on the bond or the reinsurer holds a certificate of authority from the United States Secretary of the Treasury is based on information published in Federal Register covering the date on which bond was executed.

8.5 Each bond given or tendered to HFC pursuant to the Contract Documents must be on forms approved by HFC with no changes made by Contractor or surety, and must be dated, executed, and accompanied by power of attorney stating that the attorney in fact executing such the bond has requisite authority to execute such Bond. The bonds must be dated and must be no more than 30 days old.

8.6 Surety shall designate in its bond, power of attorney, or written notice to HFC, an agent resident in Harris County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of the suretyship.

8.7 Contractor shall furnish information to a payment bond beneficiary as required by Chapter 2253 of the Texas Government Code.

8.8 Contractor shall deliver required bonds to HFC prior to commencing Work.

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## **SPECIFICATIONS**

### **I. PART 1: GENERAL**

#### **SCOPE**

1. This section pertains to the removal, replacement and updating of the current rigging system, rigging upgrades installation of a motorized variable speed front of House Curtain and installation of motor assists for all electrics, and future equipment in the Miller Outdoor Theatre in Houston, Texas. This includes all components, wiring, networking, safety systems and hardware for the replacement and upgrading existing equipment as well as any future equipment listed. Components used in facilities shall be selected for commonality of spare. Unless specifically identified, all parts of the current control system including, but not limited to starters, drives, wire ways, sensors, encoders, limit switches and other feedback and safety devices shall be of current technology.
2. The Stage equipment integrator ("Contractor") shall be the organization providing the specified equipment and services.
3. The project shall be installed November 23, 2015 to February 28, 2016. No pricing escalation after submission will be considered. All installation services shall be coordinated with HFC. Building access, dates, sequencing, scheduling, etc. must be approved by HFC.

#### **a) DELIVERY, STORAGE AND HANDLING**

- (1) Equipment shall be appropriately and substantially packed for shipment.
- (2) Equipment containers shall clearly indicate the equipment contained, "FRONT", "TOP", "FRAGILE", project name, and site location. Include packing and shipping lists for each container.
- (3) Shipping costs to job site are the responsibility of the Contractor. Shipping method/company is at the discretion of Contractor in order to meet the established project schedules.
- (4) Upon delivery to the job site, the materials shall be stored under cover in a dry and clean location, off the ground.
- (5) Vendor shall provide waterproof storage, (either SeaLand Cargo devices or a 53' trailer) for storage of both existing stage equipment and curtains during the renovation and storage of Vendor materials during the Maintenance and Upgrade period.
- (6) Replace at no expense to HFC equipment and materials unsuitable for installation or damaged during delivery, storage, or handling.

#### **b) PROJECT/ SITE CONDITIONS**

- (1) Verify all conditions at jobsite. Promptly report variations and obstructions to HFC. All additions or corrections are to be requested prior to installation.
- (2) Field measurements shall be taken for preparation of shop drawings that require them to ensure proper fitting of work. Allow for adjustments during installation.
- (3) Store equipment in such a manner that it does not interfere with work by other Sections.
- (4) Do not install equipment in dusty or wet conditions or allow dust or moisture to accumulate in or on equipment.
- (5) Protect equipment from damage by others.

c) Equipment that is not properly maintained during installation shall be replaced at no cost to HFC before final payment is made to the Contractor.

d) Contractor submissions required hereunder are due to HFC no later than November 6, 2015 and will reviewed and approved by HFC without unreasonable delay.

### **II. Part 2 GENERAL**

#### **A. THEATRICAL RIGGING SYSTEMS**

##### **1. SCOPE**

a) This specification covers the fabrication, furnishing, delivery, and installation of a performance rigging system. Contractor shall provide a complete, fully functional system as described herein.

b) All hardware and design specifications are based upon hardware designed and manufactured by JR Clancy, Syracuse NY. This is to establish a quality and consistency of design. Hardware as manufactured by H&H Specialties and Thern, Inc. shall also be acceptable, but must conform to the specified hardware in all aspects.

Contractors are encouraged to provide pricing on alternate designs and hardware subject to review and final approval by HFC.

c) General

- (1) Equipment and components shall be new, complete and of first quality.
- (2) Components shall be fabricated to resist rust and corrosion.
- (3) Metal components shall be free of rust, scale, dirt, welding spatter and foreign matter. All welds shall be ground smooth.
- (4) Mounting hardware shall be provided for all equipment.
- (5) Equipment and components shall be factory tested prior to shipping.
- (6) Wire, manila and synthetic rope shall be neatly taped with friction tape prior to cutting.
- (7) Bearings shall be of sealed or shielded variety and factory pre-lubricated.
- (8) Equipment shall be of bolt-up construction when possible for assembly removal for maintenance and inspection. Welded and drilled attachment to structural steel requires HFC approval. Welded attachment shall permit equipment removal by grinding.
- (9) In the event of conflicts within this specification, the portion of the specification with the highest standard shall take precedence. Concerns by Contractor shall be addressed to HFC.

d) Minimum Design Criteria

- (1) Bearings: 2x design load at 400 feet per minute for 2000 hours
- (2) Bending diameter to cable diameter ratio: 30:1
- (3) Bolts and fasteners: SAE J429 Grade 5, or ISO R898 Class 8.8
- (4) Drive components: 6x safety factor
- (5) Gear motors: 1.0 service factor
- (6) Maximum fleet angle: 1-½ degrees (2 degrees where grooves are designed to resist greater side thrust without harm to cable)
- (7) ALL overhead rigging elements, including cables and fittings: 8x safety factor
- (8) Cable Grooves: 1/64" tolerance maximum
- (9) Rope operating and lifting lines: 10:1, minimum 3/4" diameter

e) Included Work:

43 General Purpose sets, each set shall consist of the following:

- (a) Eight line 12" head blocks
- (b) 8" nylon loft blocks,
- (c) 8' arbors with capstan eyes, roller guide shoes
- (d) Floor blocks with guide shoes
- (e) 63'-0" Schedule 40 battens
- (f) New wire rope lift lines
- (g) New hand line
- (h) Banding for existing 2" cwts to arbor for pipe weight.
- (i) Alloy trim chains and all associated hardware (thimbles, copper oval swages & shackles) for wire rope termination
- (j) New cable compensation system for all sets

- (k) New keeper rings and/or dogs for existing rope lock handles if retained
- (l) New rope locks as required
- (m) Motorized electric line sets
- (n) Hoist control system capable of repeated moves and cue programming
- (o) Controls system commissioning and training
- (p) Locking rail with reaction bar for capstan hoist
- (q) New counterweight for manual line sets
- (r) 10 Power Assist electrics
- (s) 1 High Speed Front Curtain System
- (t) 3 additional 1200' spools of white 3/4" Stage-Set-X handline
- (u) Production lighting power and control cable removal and storage
- (u) Two (2) Storage Containers shall be provided. Data Sheet provided elsewhere in the specification. (SK1)

f) Related Work: Related work that is included in this section:

- (1) Structural steel to support the rigging equipment, ladders, catwalks, and all other structural steel and miscellaneous metals not specifically called out as part of this section.
- (2) Electrical work required for the ten (10) electric power assist line sets and for the Front Curtain motor system and controls.
- (3) Structural Engineering and stamped drawings will be required as part of the project submissions. It is the responsibility of Contractor to review the structural requirements of the project and provide whatever is necessary for a structurally complete and approved system.
- (4) An access means is required for maintenance and annual inspection of motorized rigging.
- (5) All power and control wire, containment, and terminations are provided by Contractor. Contractor shall use a licensed Electrical Contractor to provide all power and control wiring.

g) The Miller Outdoor Theatre Stage shall be emptied by the Miller Outdoor Theatre staff and the stage area shall be cleared to allow for all work by Contractor.

- (1) Contractor shall confirm in writing access to the space with HFC.
- (2) Contractor shall supply storage for Miller stage equipment as well as there equipment for the entire installation period.
  - (a) Storage shall be coordinated with HFC but should include appropriate SeaLand containers or 53' Trailers as needed.

## 2. SUBMISSIONS

- a) Drawings: Submit component and project specific installation drawings, cut sheets, and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation. The submission shall be approved by HFC before beginning any fabrication, installation, or erection. Submission shall be provided in DWG and PDF format, hard copy and electronically.
- b) Bill of Material: A copy of the Bill of Material shall be included with the submission for approval.

## 3. FIVE YEAR WARRANTY

- a) All rigging equipment shall include a five-year warranty against defects in materials or workmanship that goes into effect on the date of completion. Contractor shall provide any required annual inspections and training on its use by an Entertainment Technician Certification Program (ETCP) Certified Theatre Rigger required by the manufacturer as a condition of such warranty at Contractor's sole cost and expense.

## 4. CONTRACTOR QUALIFICATIONS

- a) Contractor shall be an approved rigging manufacturer or an authorized representative or dealer of an approved manufacturer. Contractor shall have been installing stage-rigging systems for a period of five years or more, and

shall have completed at least seven installations of this type and scope. HFC shall be the final judge of the suitability of experience.

b) Contractor shall employ an Entertainment Technician Certification Program (ETCP) Certified Theatre Rigger. A Certified Rigger shall be either the project manager or site foreman, and be responsible for the overall project including the layout, inspection, and onsite user training.

### III. Part 3 PRODUCTS

#### A. THEATRICAL RIGGING EQUIPMENT

#### B. GENERAL

1. Project is to be installed using standard, off-the-shelf rigging and control equipment with custom fabrication kept to a minimum. The following manufacturers are pre-approved:

- a) J.R. Clancy, Inc.
- b) H&H Specialties
- c) Thern, Inc.

2. Theatrical rigging systems are specialized overhead lifting systems. Due to the highly specialized nature of theatrical rigging equipment, and the safety requirements of the equipment, the rigging products provided for this work shall be the products of a single rigging manufacturer where possible for quality, consistency and ease of integration. Accessory items such as wire rope, fittings, and curtain tracks may be from other specialty manufacturers.

3. The rigging manufacturer must have the following programs in place:

- a) The manufacturer must have a product-testing program, including determination of recommended working loads for products based on destructive testing and review by a licensed engineer.
- b) The manufacturer of the performance equipment must have a quality management system that is registered to the ISO 9001:2008 standard.
- c) The manufacturer must carry primary product and general liability insurance of \$2,000,000 each, with excess liability coverage of \$10,000,000 and a Contractors Professional Liability policy with \$2,000,000 coverage.

4. Alternate manufacturers may be accepted, provided that the proposed manufacturer meets the following minimum qualifications and the proposer discloses in full the manner and extent to which rigging and/or control products from such alternate manufacturer will be used in the Project.

- a) Evidence that the manufacturer has been in business for a minimum of ten years manufacturing stage equipment.
- b) A listing of 7 equivalent installations, including:
  - (1) Name, address and telephone number of owner
  - (2) Name, address and telephone number of architect and/or consultant
  - (3) Scope of work
- c) A brief written description of the manufacturer's operation including facilities, financial capabilities, and experience of key personnel.
- d) Written, third party evidence showing that the manufacturer has the testing, quality management and insurance programs required above in place.

5. Standards:

- a) Materials shall conform to the following ASTM and ANSI standard specifications:
  - (1) ANSI B17.1M - Keys and key seats
  - (2) ANSI B18.2.1&2 - Specification for square and hex bolts and nuts
  - (3) ANSI B106.1M - Design of Transmission Shafting
  - (4) ANSI E1.4 - Entertainment Technology – Manual Counterweight Rigging
  - (5) ANSI E1.6-1 - Entertainment Technology – Powered Hoist Systems

- (6) ANSI E1-22 - Entertainment Technology – Fire Safety Curtain System
- (7) ASTM-36 - Specification for structural steel
- (8) ASTM-48 - Specification for gray iron casting
- (9) ASTM-120 - Specification for black and hot-dipped zinc-coated, (galvanized) steel pipe for ordinary use

b) In order to establish minimum standards of safety, the following factors shall be used:

- (1) Cables & fittings - 8:1 Safety Factor minimum
- (2) Cable D/d ratio - Sheave tread diameter is the minimum D/d ratio per the "Wire Rope User Manual" or recommended by the wire rope manufacturer
- (3) Tread Pressures - 500 lbs. for cast iron, 900 lbs. for Nylatron, 1000 lbs. for steel
- (4) Max. fleet angle - 1-1/2 degrees
- (5) Steel - 1/5 of yield strength or per AISC Specification
- (6) Bearings Two times required load at full speed for 2000 hours
- (7) Bolts - Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
- (8) Motors - 1.0 AGMA Service Factor
- (9) Gearboxes - 1.25 Mechanical Strength Service Factor
- (10) Gearboxes - 1.0 Gearing Service Factor

c) Materials: All materials used in this project shall be new, unused and of the latest design. Re-furbished are not permitted except as noted. Obsolete materials are not permitted

d) Head blocks: Recommended working load of head blocks shall exceed the overall load imparted on the head block.

e) Sheaves

(1) Sheaves shall be of the following materials, as specified:

- (a) ASTM A-48 Class 30 grey iron castings
- (b) Molybdenum disulphide filled or polyamide Nylon
- (c) Steel

(2) Groove depths shall be sufficient to fully encompass the cables and ropes. Grooves shall have sloped sides (8 degree minimum) and conform to rope and cable manufacturers' standards for groove shape and tolerance.

(3) All rope and cable grooves in a sheave shall have equal pitch diameters.

f) Bearings

- (1) Bearings shall be manufactured per AFBMA/ANSI standards
- (2) Ball bearings shall be sealed precision with double seals
- (3) Pillow block bearings must be loaded into their base.

g) Block Shafts

(1) Shafts shall be machined steel, have fine screw threads, and be keyed to one side plate to prevent rotation.

(2) Shaft lengths shall be set so that the shaft bears on a side plate for full strength, not on threads.

(3) Proper adjustment of the sheave and bearings shall be accomplished by means of a fine thread, self-locking nut on the opposite end of the shaft. Each sheave shall run plumb and true without rubbing its side plates when rotated.

h) Block Side Plates

- (1) Hot rolled steel.

(2) Spacers shall be used to stiffen the side plates and to prevent cables from escaping from the sheave grooves.

i) Fabrication

(1) The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard to personnel.

(2) All moving parts shall meet specified tolerances.

(3) All equipment shall be built and installed to facilitate future maintenance and replacement.

j) Finishes

(1) Paint shall be the manufacturer's standard black finish except as noted.

(2) All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted.

k) Recommended Working Load: This specification calls for minimum recommended working loads for many hardware items. This is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by a Licensed Professional Engineer.

## 6. MANUAL RIGGING

### a) HEAD BLOCK

(1) 12" Nylon Head Block:

(a) The sheave shall be filled nylon with a 12" outer diameter. The sheave shall be equipped with a 1" diameter shaft and two tapered roller bearings.

(b) Base angles shall be a minimum 2" x 1.5" x 1/4" angle with the short leg turned in and notched as required.

(c) Side plates shall be a minimum of 10-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted and welded to the base angles for extra strength.

(d) Double purchase blocks shall have punched angles and an additional pipe spacer properly placed to provide tie-off points for lift lines so that proper fleet angles into the arbor top sheave are maintained.

(e) The block and associated mounting hardware shall have a recommended working load of at least 2,500 lbs., or as shown on drawings.

(f) Head blocks shall be grooved for eight 1/4" lift lines and one 3/4" hand line.

### b) LOFT BLOCKS

(1) UNIVERSAL LOFT BLOCKS

(a) The sheave shall have an 8-1/2" outside diameter, and shall be filled nylon. The sheave shall be equipped with a 17 mm diameter shaft and two sealed, precision ball bearings.

(b) Base angles shall be a minimum 1-1/2" x 1-1/2" x 3/16" angle punched with a universal hole pattern for easy installation.

(c) Side plates shall be a minimum of 12-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted to the base angles.

(d) The block and associated mounting hardware shall have a recommended working load of at least 750 lbs., and shall be designed for use in either upright or underhung usage.

(e) Loft blocks shall be grooved for one 1/4" lift line.

(f) Underhung loft blocks shall include idler assemblies

(i) Loft block idlers shall be provided to carry the weight of the cables and prevent rubbing against adjacent block side plates. They shall not be installed to carry line loads or to act as deflector or mule blocks.

(ii) Idler assemblies shall consist of one or two 3-1/2" diameter, 3-line filled ABS idler pulleys mounted on the side of the loft block housing.



(iii) The sheaves shall have 1/4" cable grooves and two sealed, precision ball bearings and shall ride on a 1/4" shaft inserted through the block housing.

(iv) A 1/8" diameter bail shall mount in the housing and captivate the cables in the grooves.

(v) All nuts shall be of the nylon insert self-locking type.

#### c) FLOOR BLOCKS

##### 1) 10" Tension Floor Block:

(a) The cast iron sheave shall have a 10" outside diameter and shall be an iron casting with a machined groove for a 3/4" rope.

(b) The sheave shall be equipped with a 17 mm diameter shaft and two sealed, precision ball bearings.

(c) Side plates shall be a minimum of 3/16" steel plate.

(d) The block shall have a minimum weight of 40 lbs. to properly tension the hand line.

(e) A plastic kick tab shall be provided for adjustment of the rope tension.

(f) The floor block shall be held in place and guided in the T-bar, J-bar, or A-bar guides by two guide shoe assemblies, each consisting of two guides and one spacer made of 5/16" thick steel plates. Each guide shall be secured to the housing by means of two 3/8" hex head bolts and nuts.

#### d) MULE BLOCKS

(a) The sheave shall have a 12" outside diameter and shall be filled nylon.

(b) The sheave shall be equipped with a 1" diameter shaft and two tapered roller bearings.

(c) Side plates shall be a minimum of 7-gauge steel, and shall fully enclose the sheave.

(d) Side plates shall be fillet welded to an 8" formed steel channel base. Bracing tubes with a minimum size of 2" x 2" x 3/16" shall be welded to both side plates and the base for added strength.

(e) There shall be a minimum of four 3/8" bolts with spacers between the side plates for structural strength and to prevent cables from escaping the sheave grooves.

(f) The block shall have a recommended working load of at least 1400 lbs.

(g) Mule blocks shall be grooved for one, two, four or eight 1/4" lines.

#### e) ARBORS

(1) Arbor shall be of specified length, or long enough to accommodate counterweights to balance its pipe batten and related equipment, whichever is longer. There shall be at minimum, 8' of loadable space.

(2) The arbor top shall be a 1/4" steel plate formed into a channel with 3" sides and punched to receive 8 cables. A bolt and spacer shall tie the legs together and provide a tie-off point for the hand line. The front of the arbor top shall carry a 1- 1/2" high white set number.

(3) The arbor bottom shall be of similar construction, with counterweight rests to keep the weights from resting on the inner arbor rod nuts.

(4) The top and bottom of the arbor shall be tied together by means of two 3/4" steel arbor rods and a 3/8" x 3" steel back plate. The arbor rods shall have three nuts at each end, the outermost being a lock nut.

(5) Two guide assemblies shall be provided. Each shall be a roller-type guide made to work with the existing arbor guide wall. They shall be secured to the arbor by means of two 3/8" hex head bolts and lock nuts.

(6) Provide 12-gauge spreader plates (two minimum) on arbor rods so they can be spaced between counterweights on 2-foot centers. Provide a retaining collar on each rod, each with a 1/4" set screw with red plastic knob for easy locking. The front retaining collar shall be welded to the top spreader plate.

(7) Provide labels on the steel back plates showing the proper locations for the spreader plates.

#### f) ROPE LOCK

(1) The rope lock shall consist of an ASTM A536 ductile iron housing, cams and handle. The cams shall compress the rope, not bend it over tight radius corners that reduce its strength. The housing shall allow the use of a standard padlock to hold the handle in its closed position.

(2) In order to reduce noise during operation, there shall be a rubber bumper in the housing to silence the handle when it is opened. The dogs that grip the rope shall be machined to fit closely to reduce noise and not use washers.

(3) Adjustment for rope shall be from 5/8" to 1" by means of a 0.5" nylon tipped, socket head adjustment screw with lock nut at the rear of the housing.

(4) The handle shall be 9" long with a nylon powder or vinyl dip coating. The handle shall be installed so that it passes two degrees past vertical to lock the hand line.

(5) A coated, oval, welded steel ring shall be provided as a safety lock.

(6) The rope lock shall mount to the locking rail with four 3/8" hex bolts and lock nuts.

(7) The existing Rope Locks may be reused if Contractor provides a full inspection, replacement of the 'dogs' as required, refurbishment and provides a complete warranty for the locks.

#### g) T-Bar Wall

(1) Existing T-Bar Wall shall be refurbished. T-Bar Wall shall be checked and corrected as needed per local and national codes and established industry standards.

(a) If necessary, T-Bar shall be modified and/or repaired to accommodate new Arbors, cable compensation, Power Assists, and Motorized Rigging as needed.

(b) Arbor guide systems shall smoothly and silently guide counterweight arbors, power assist arbors and motorized arbors along their full paths of travel.

(c) The minimum spacing between guide rails shall be such that adjacent counterweights or obstructions cannot come into contact with each other.

(d) Guide rail systems shall consist of Extruded Aluminum Strut Guide System with an integral T-Shape profile with a 1-1.2 inch X 3/16 inch flange, rigidly fastened to a horizontal supporting structure at not more than five-foot intervals.

(e) Guide rails shall be attached to steel support members located perpendicular to the guide rails.

(f) All splices shall be finished in a manner that provides smooth transition between the abutted edges, without offset, warping or twisting of the rails.

(g) Guide rail horizontals shall be rigidly attached to the building structure so that the guide rails cannot move in any direction.

(h) Guide rail horizontals shall also be equipped with bracing when required to maintain rigidity of the guide system. The bottom support shall be bolted or anchored to the floor using anchorages specifically designed for the loads, mounting surfaces and earthquake requirements.

(i) Stop battens or bars shall be attached where they will provide a secure stop for the arbors at their designated upper and lower limits of travel, and shall be structurally attached in locations that prevent interference by the arbor or stop, with any other component of the system. The bottom stop shall be located above the level of the tension blocks and shall be capable of supporting the weight of a fully loaded arbor, plus an additional 50 lbs. of allowable load imbalance. The top stop shall be capable of supporting the weight of a batten when locked to the capacity of its arbor, plus an additional 50 lbs. of allowable load imbalance. Harwood bumpers shall be bolted to the impact face of both stop assemblies, or shall be permitted to attach to the top and bottom of the arbor assembly.

(j) New Headblocks shall be positioned over the guiderails so that the support lines are plumb and counterweight arbor does not impose a horizontal force on the guide system.

#### h) LOCKING RAIL

(1) The locking rail shall the length shown on the drawings and punched to allow the set centers shown on the rigging schedule.

(2) Rope locks and index cards shall be mounted on a formed steel angle no smaller than 3-1/2" x 5" x 1/4".

(3) The onstage edge of the rail shall be sloped and punched to receive formed clips that hold index cards centered on the installed sets. Provide one numbered plastic write-on card for each installed set.

(4) Stanchions made from 1/2" x 3" flat bar shall be provided on 5' (maximum) centers.

(5) The entire locking rail shall be designed and installed to withstand a minimum up load of 500 pounds per foot per AISC standards.

(6) The existing locking rail may be reused if Contractor provides full inspection, repair and replacement as required, complete refurbishment, if needed and provides complete warranty.

(a) If locking rail is replaced, old locking rail will be removed and disposed of at the direction of HFC.

#### i) COMPENSATING CABLE SYSTEM

(1) A compensating Chain System shall be provided to balance the transfer weight of the lift lines from the batten to the arbor as counterweight sets are raised and lowered.

(2) Roller chain is attached to the bottom of the arbor and to a T-Bar wall batten at the midpoint of the T-Bar battery. The T-Bars are spaced away from the wall battens to the chain travels in the space between the arbor back bars and the wall battens. Size of the chain is so that weight is added to the arbor to balance the cable weight added to the batten as the batten is lowered.

#### j) HARDWARE AND ACCESORIES

(1) Turnbuckles

(a) Turnbuckles shall be drop forged and galvanized, and conform to ASTM F-1145 Type 1, Grade 1 standard. Turnbuckles shall be moused after adjustment to prevent loosening.

(2) Full Pipe Clamps

(a) Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.

(b) There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.

(c) Full pipe clamps shall have a manufacturer's recommended load rating of at least 750 lbs.

#### k) Pipe Battens

(1) Battens shall be primed and painted with two coats of high quality flat black paint.

(2) Mark pipe at 1'-0" increments from center out, and at batten ends. Label live load capacity near center. Markings shall be stenciled at upstage side of pipe in yellow or white enamel.

(3) Contractor shall note that the Centerline of the theatre is off by approximately 24" and shall compensate in the markings to adjust for this anomaly.

(4) All electrics shall be provided with truss battens based upon sketch provided with these specifications.

(5) Five of the manual counterweight sets shall be provided with truss battens. The owner will select the five linesets at time of project submission.

#### l) General Purpose Battens

(1) Sleeved pipe battens shall be constructed of 1-1/2" nominal (1.9" outside diameter) Schedule 40 steel pipe per standard industry practice.

(2) Battens shall support 30 pounds per linear foot live load minimum.

(a) Offset splice locations from pickup locations.

(b) 24" close-fitted internal splice sleeves secured by two through-bolted 1/4" x 20 cap screws. Holes 6" on center, 3" from ends of splice sleeves.

(c) Provide two set bolts typical at each end of batten, for engaging batten extensions.

(d) Provide yellow soft plastic removable batten end caps covering last 2" to 2 1/2" of pipe, for increased visibility of batten ends.

(e) All general purpose battens shall have a total of (8) cable drops from the grid.

(3) Trim Chains:

(a) Trim chains for battens 1-12 shall be 13' long, made of 1/4" plated, grade 30 Proof Coil chain. Trim chains for all other battens shall be 72". Connection between the end link and the lifting cable shall be made with a thimble and copper Nicopress sleeve. Chains shall be wrapped one and one half turns around the batten and attached back to the thimble at the end of the lift line with a 1/4" forged shackle. Adjustment is made by connecting the shackle into a link along the return side of the chain.

(b) Trim chains shall have a recommended working load of at least 750 lbs.

m) Counterweight

(1) Contractor shall deliver to jobsite a total of 20,000# of counterweight sized appropriately for the Arbors being supplied.

(2) Counterweight shall be delivered primed painted and loaded on palettes

n) Hand Line

(1) Hand lines shall have a parallel filament core constructed of high-tenacity filament polyester. The core shall remain firm and round under all load conditions, and be dense enough to allow it to be clamped in a rope lock without damage. The core shall be wrapped in polyester tape to provide the core with protection against external damage and wear. The braided polyester outer jacket shall be constructed of spun polyester for good gripping.

(2) The rope shall hold knots well, be easily spliced. Rope shall not be subject to rotting, mildew, resistance to UV, or moisture damage, nor shall its length be affected by changes in humidity.

(3) Tape ends before cutting. Attach to arbor with two half hitches or bowline and tape end to standing line with electrical tape. Tape shall be designed for high temperature, high humidity.

(4) Hand lines shall be Stage-Set-X rope. Provide rope in white.

7. Winch Floor Beam

a) Install below the floor blocks directly to the cement foundation a beam of sufficient size to allow for a safe tie-point.

(1) Installation of this beam will require the removal and replacement of the stage floor area below the floor blocks, installation of properly sized beam and cosmetic completion of the area.

(2) Sketch provided is for concept only. Contractor shall provide engineered stamped drawings indicating the actual installation of the beam.

C. Existing Hardware shall be removed and disposed of at the direction of HFC. All items to be removed or replaced shall remain the property of HFC unless designated by HFC for disposal.

D. AUTOMATED RIGGING

1. COUNTERWEIGHT ASSIST HOIST

a) General

(1) The single axis hoist shall be used to motorize counterweight-rigging sets.

(2) The hoist shall be of a compact design with all required components integrated into its structure. It shall be floor mounted in place of a floor block and rope lock. Its starter and control mount to the locking rail.

(3) The hoist assembly shall be less than 12" wide, and be able to automate a set that is located between counterweight sets on 6" centers or greater.

(4) Single axis hoists shall have a speed of 25 fpm with a total line set capacity of 2,000 lbs. The hoist will handle an out of balance load equal to 50% of the set capacity. The counterweight arbor will be permanently loaded to 50% of the set capacity. The counterweight in the arbor shall be banded in place, and a method to impede the installation of additional counterweight provided. A sign shall be provided warning the user not to adjust the weight in the arbor.

(5) All components shall be designed to properly support the required loads.

b) Motor, Gearbox and Brake

(1) A motor, gear reducer and primary brake shall be provided. Motors shall be totally enclosed fan cooled (TEFC) per NEMA MG1.

(2) The gearmotor shall have a minimum service factor of 1.0 and be provided with seals to effectively prevent leaks.

(3) Brakes shall be spring applied, direct acting, electrically released, and equipped with a manual release. The brake shall be an electro-magnetic unit with a minimum retarding torque of 200% of motor full load torque. The brake shall be released by energizing the coil simultaneously with the motor winding to provide fail-safe braking in case of power failure.

c) Drive Medium

(1) The drive medium shall allow the use of a counterweight set head block without modification and shall be positively driven in a manner that will allow repeatable positioning.

(2) The drive medium shall have a minimum design factor of 10:1

(3) Roller chains shall have a double leaf construction. UHMW chain guides shall be provided to ensure positive engagement of chain and sprockets, even with slack in the drive chain.

(4) The portion of the drive medium that runs on the head block shall operate at the same pitch diameter as the lift lines so that they operate at the same speed, to avoid excessive cable wear and "jumping" caused by differing speeds.

d) Limit Switches

(1) Rotary limit switch assemblies shall have four gear-driven, independently adjustable switch/cam sets. Switches shall have snap acting contacts.

(2) Rotary limit switches shall be driven directly or by roller chains. If roller chains are used, sprockets shall be pinned to prevent slipping and sized for maximum usable rotation of switch cams. The input shaft and drive chain shall be fully guarded.

(3) Switches shall be mounted to the winch base to allow for easy adjustment of the switch settings.

e) Fixed Speed Motor Controllers

(1) For fire and electrical safety, motor controllers shall conform to the NEC (NFPA 70), be built in accordance with UL Standard 508, and be "touch safe" per IEC 60204-1 "Protection against direct contact" rules.

(2) Controllers shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch. Operation of an overload limit switch shall open the line contactor and will not allow further movement in either direction. A spring return toggle switch shall be housed inside the starter cabinet to allow override of the overtravel limits for resetting purposes.

(3) The controller shall be sized to match the hoist motor horsepower. Overload and overcurrent protection shall conform to UL and NEC requirements.

f) Control Station (Standard)

(1) Control stations shall be contained in the hoist assembly, and contain hold to operate (dead man) Up and Down pushbuttons for each hoist. A key operated On / Off switch shall be provided.

(2) A red, mushroom head emergency stop pushbutton shall be provided, which will disconnect power to the winch through a circuit meeting NFPA-79 (Electrical Standards for Industrial Machinery) requirements.

(3) A "Service" indicator shall be provided to alert the user when regular system service is required.

(4) Panel components (pushbuttons, key switches, switches, indicators, E-stop switches, and the like) shall be industrial grade units.

g) Position Control

(1) The user shall be able to set four preset stop positions. The winch will stop at each preset position, and an "At Target" indicator will illuminate. Releasing and pressing the Up or Down button again will move the load to the next preset position.

(2) Presets positions are set by the user by moving the load to the desired position, and performing a simple control sequence.

(3) The system shall provide reliable, accurate positioning within 1/16" of the target position.

(4) A solid-state position encoder shall be provided.

- h) The single axis counterweight assist hoist shall be the PowerAssist hoist as manufactured by J.R. Clancy or approved equal.
- i) The electrical work required to operate the PowerAssist hoists shall be the responsibility of Contractor.
- j) Provide (10) power assist systems for line sets 4, 5, 13, 14, 23, 24, 33, 34, 39, & 47.

#### **IV. ZERO FLEET HEAVY DUTY HOIST – Front Curtain**

##### **(1) General**

- (a) The hoist shall be specifically designed for lifting loads in theatres and other places of public assembly. It shall have a compact design with all required components integrated into its structure. Hoists shall have integrated safety covers.
- (b) The hoist shall incorporate a sturdy frame and adjustable mounting clips for easy mounting, either horizontally or vertically, on beams centered up to 12'-0" apart. No external strengthening members shall be required.
- (c) Characteristics: The hoist shall have the following characteristics:
  - (i) Speed and lifting capacity – to 400 fpm and maximum capacity of 1250 lbs.
  - (ii) Travel: Up to 60 feet
  - (iii) Lift Lines: Up to (8) 1/4" diameter, 7x19 galvanized utility cable
  - (iv) Units shall be available for all standard 60 Hz and 50 Hz power sources without the need for transformers.
- (d) The hoist shall use a moving drum to minimize hoist size and wire rope wear. The drum shall move along its axis as it rotates, keeping the cable takeoff points on the drum aligned with the head block sheaves incorporated in the hoist (zero fleet angle design).
- (e) Hoists shall be designed such that multiple units can be mounted 16" on center, or 8" on center if hoists are alternated on stage left and right.
- (f) Hoists shall not be used to lift humans.

B. Included with these specifications are (3) proof of concept studies regarding the mounting and installation of the high-speed front of house curtain motor.

C. These Sketches are intended as proof of concept only. Contractor shall provide final design and all structural steel, (approved by a licensed Structural Engineer in the State of Texas) for approval by HFC.

1. It is not the intention of these Sketches to indicate a preferred method of installation. Contractor is encouraged to consider all possible options to meet the intention of the specification, ease of operation, ease of installation, and ease of maintenance.

D. All electrical work shall be provided by Contractor.

1. It is Contractor's responsibility review the electrical work required and arrange for power to be provide to all electrical motors and related items in this project.

2. All permits, engineered drawings and licenses shall be the responsibility of Contractor.

E. Gearmotor and Primary Brake

1. The motor, primary brake and gearbox shall be an integrated unit from a single manufacturer. For enhanced reliability, a continuous shaft shall link the brake, motor armature, and the first stage pinion gear without the use of couplings.

2. Motors shall be totally enclosed fan cooled (TEFC) per NEMA MG1. Motors shall have a minimum service factor of 1.0.

3. The gear reducer shall employ helical gearing. The gear case shall be cast iron for protection against shock damage and to provide noise reduction. The output shaft shall have triple lip oil seals to prevent leaks.

4. The primary brake shall be spring applied and electrically released, with a minimum retarding torque of 150% of motor full load torque.

5. For added security, a spring applied and electrically released electro-magnetic load brake shall be located between the output shaft of the gearbox and the drum. The brake controller shall apply the brake if the speed exceeds the commanded speed, the maximum speed, or if it detects a failure in the integrity of the shafting and gearbox.



## F. RIGGING CONTROL SYSTEM

### 1. SCENECONTROL 5200 STAGE MACHINERY CONSOLE – Base Project

#### a) General

##### (1) Architecture

- (a) Communications between all Operator Interface devices shall be performed over an Ethernet based system
- (b) Communications between Operator Interface devices and controllers shall be performed over a commercially available network protocol such as Ethernet, DeviceNet, ProfiNet, etc.
- (c) The exception to (a) and (b) above being local control pendants / push buttons that are hard wired to discreet inputs and outputs

##### (2) Multiple Consoles

- (a) The System shall be able to accept multiple consoles on the same network and have a file management system that supports such architecture.
- (b) All consoles in a system shall utilize the same operator interface software
- (c) Where multiple consoles are employed on the same network and controlling a single system of controllers a Network Storage device shall be employed to centralize file storage and backup

##### (3) Offsite monitoring

- (a) The manufacturer shall have the ability to connect to the system remotely via a secure network appliance as specified and approved by HFC's IT department

##### (4) Operating Surface

###### (a) Operator push buttons

- (i) At minimum the operator must have push buttons available for the following functions that are not part of any touch screen functions

- (a) GO
- (b) STOP
- (c) RESET

###### (b) All push buttons must be illuminated

- (i) GO button must be GREEN
- (ii) STOP button must be RED
- (iii) Other functions shall be BLUE

- (c) When a button is pressed and the press signal has been seen and acknowledged by the desktop processor the operator must be informed of the recognition of the press by flashing the lamp illuminating the button OFF and back ON once

###### (d) Multiple presses

- (i) The console software shall prevent an operator from making simultaneous multiple button presses
- (ii) Should the operator press more than one button concurrently the console software shall ignore both presses, fault and automatically reset
- (iii) The log files shall then record what buttons were pressed, the console fault and console reset

##### (5) Macro buttons and signals

- (a) All macro features used for cueing shall be presented on the touch screen

##### (6) Hold-To-Run handle (a.k.a. Deadman or Enabling Switch)

- (a) The Hold-To-Run (HTR) shall operate as a deadman signaling the software and hardware systems that the handle is held in place
- (b) The HTR shall be comfortably held by the operator in the active ON position by the weight of the one hand when it rests upon the console desktop surface in such a position as to allow the

operator to reach the GO and STOP buttons with their fingertips

(i) The handle should be large enough that it may also be held by the operator's free hand should they choose to do so

(c) Switches used on the HTR shall have three position functionality (OFF-ON-OFF)

(d) The button shall have three positions

(i) Position 1: TOP – DEACTIVATED

(a) Pressure released

(ii) Position 2: CENTRE – ACTIVATED

(a) Held in place by operator

(iii) Position 3: BOTTOM – DEACTIVATED

(a) Over travel pressure causing circuit to break

(e) Position operating force:

(i) Position 1 to 2 – within  $\pm 5\%$  of 3N (approx. 0.67lbs)

(ii) Position 2 to 3 – within  $\pm 5\%$  of 15N (approx. 3.3lbs)

(f) Circuit opening force from position 2 – 3 shall be 30N (approx. 7lbs)

(g) The handle shall be illuminated to provide visual feedback to the operator that the signal is active

(h) Illumination signals shall be attached to the following functions

(i) ACTIVE (ready to run state) – BLUE

(ii) DEACTIVATED (not ready to run) – AMBER

(iii) E-STOPPED – RED

(i) Standards:

(i) Positive action contacts ON (position 2) to OFF (position 3) ensure no contact welding per EN60947-5-1 / IEC60947-5-1

(ii) Contacts will not close when released from OFF (position 3) to OFF (position 1) per IEC60204-1; 9.2.5.8)

#### (7) Input Devices

(a) Provide input devices for human machine interfaces

(i) Dedicated software function push buttons as described

(ii) Optional: One each single axis joystick for control of the motion control software's jogging feature

(iii) Optional: 10 illuminated software programmable macro function keys

(iv) Ability to add an external USB connected multi-axis joystick

#### b) Monitors

(1) One each minimum 10.1", 1080p capacitive touch screen

#### c) Alarm Annunciation Devices

(1) Configuration

(a) Alarms shall be configurable in the console and/or motion control software

(2) Visual annunciation

(a) At minimum display visual alarms on screen using pop-up windows, screen buttons or signals

(3) Audible

(a) At minimum an audible alarm shall be present on the operator console in such a place as making it difficult to mechanically disable without the use of tools to open the console case or access a mechanically protected section of the console structure

(b) Audible alarms shall not sound by default but instead be a programmable feature managed by the operator and Administrator to signal System Alarms.

(4) External devices

(a) The console may also incorporate external alarm devices (such as klaxon alarms or flashing lights). Where these are employed they must be installed in tamper resistant boxes and be monitored for tampering, power loss and disconnect (being unplugged)

d) Other Features

(1) Hard Drives

(a) All hard drives used within the console shall:

(i) Be reliable and robust

(ii) Provide at least 32GB of free storage space excluding the space used by the operating system

(iii) Have an minimum operating temperature range of between 0 degrees Celsius (32 degrees F) to 60 degrees Celsius (140 degrees F)

(b) Network Attached Storage

(i) Hard drives may also be backed up to an optional Network Attached Storage drive

(2) Backup features

(a) Provide external USB ports for copying files for offsite backup

(3) User work light

(a) Provide two each LED gooseneck lamps with a dimming device

e) Console Options and Dimensions

(1) 19" Rack Mount

(a) Dimensions: 5RU H x 19" W x 6" D

(b) Note: 1 RU (Rack Unit) = 1.75"

(2) Hand Held Pendant Controller

(a) Dimensions: 11.06" H x 12.24" W x 2.95" D (3.73" D w/ Estop operator)

f) Options available for Rack or Surface Mount Console

(1) Quantity 10 illuminated function keys, quantity 1 joystick

(a) Dimensions: 3 RU H x 19" W

g) Mechanical

(1) Power Supply

(2) 100-240V, 15A, 50/60HZ

## 2. STAGE MACHINERY SOFTWARE

a) General:

(1) The System shall be able to accept multiple consoles on the same network and have a file management system that supports such architecture.

(2) The Software shall have the ability to:

- (a) Start / Stop an Axis multiple times within a cue based on programmed sequential timing
- (b) Send an Axis to multiple targets, possibly changing directions without engaging the brake within a single cue.
- (c) Start an Axis that ran in a cue, in a following cue, where the previous cue is still running but that Axis is not.
- (d) Run more than one cue at a time without the use of sub-masters.
- (e) Run repetitive motion loops.
  
- (f) Send an axis that is in a repetitive motion loop to a new position without a transition cue or setting the brake.
- (g) Stop an axis or axes in a controlled cued manner (stop command).
- (h) Stop all axes in motion using the console STOP button.
- (i) PAUSE and RESUME all axes in motion.
- (j) Change the speed of an axis in motion. The change of speed may be triggered by the position of the axis or by an input changing state / value.
- (k) Change the speed of an axis or a group of axes in motion through the use of a feed rate wheel or joystick command on the console.
- (l) Trigger I/O effects
  - (i) As an example: locking pin motors, signaling lamps, kabuki drops
- (m) Create motion profiles based on time or velocity.
- (n) Sequential cues or autofollow cues based on user identified criteria

#### b) Operating System

- (1) The OS of the system shall be MS Windows embedded based.

#### c) User Administration

- (1) All access to the Control System Software shall be via a User ID and Password
- (2) Administrators shall have the ability to limit the user's access to:
  - (a) Specific views
  - (b) Specific actions
  - (c) Operation of machinery by restricting permission to run hoists which the operator has either not been trained to use or are out of the scope of the operator's technical function
  - (d) Limit speed of operation of all or specific hoists
- (3) Where a system incorporates multiple consoles all consoles shall utilize a common user database. Administrators shall only need to edit this one file to update all consoles with a user's settings, passwords and permissions.

### 3. User Levels

#### a) There shall be a minimum of 4 basic user levels

- (1) Vendor Administrator – accessible only by manufacturer
- (2) User Administrator – Setup by manufacturer but may be edited after setup by HFC
- (3) User Operator Level 1 – Default settings allow Operator to perform all tasks but Administrative control setup tasks. May be edited or altered by user Administrator.
- (4) User Operator Level 2 – Default settings do not allow Operator to edit cue or programming changes. May be edited or altered by user Administrator.
- (5) All users may be restricted from having permission to access and / or operate any of the axes in the axes list. This setting is adjusted by the User Administrator.

#### b) Controller / File Setup Security

- (1) All access to the controller or file setup shall be protected by the Administrator password.

(2) The administrator may access the protected setup windows without being logged in. A pop-up window will ask for the administrative password before opening the requested window.

(3) Once closed the window will not reopen unless the password is once again provided.

Password text must be hidden or represented by an asterisk

#### c) Graphic Interface

(1) The Stage Machinery Control Software shall have a user-friendly graphic interface that utilizes multiple Windows to display information clearly and concisely.

(2) Cue data shall be displayed in a spreadsheet format

(3) Cues shall be displayed in a Tree Format

(a) The Cue Tree shall have the ability to be organized into scene groups to allow the operator to quickly and easily find cues.

#### d) Administrative Windows

(1) Controller Setup: The Administrator shall have the ability to open controller setup windows to create or edit controllers

(2) Application Options: The Administrator shall have the ability to setup the basic look of the system software and the display of axis details.

(3) User Manager: The Administrator shall be able to add, delete and edit users and configure their level of system access and what and how they may control axes.

#### e) Software Faults and Errors

(1) Should a fault and or error occur with the operation of the motion control software or the computer operating system all controllers in the system will initiate an immediate controlled E-Stop deceleration to bring all motion to a complete stop

(2) Should a fault and or error occur on the communications network between the motion control software and the controllers in the system, the controllers will initiate an immediate controlled E-Stop deceleration to bring all motion to a complete stop

#### f) Localization of Language

(1) The software shall be switchable between English and two other languages as mutually agreed at the time of contract award

(2) The software shall support Unicode character sets to allow for the input and display of Western, Russian, Asian and Arabic characters

(3) Reports, printouts or files used for factory technical support shall remain in English

#### g) Operator Windows

(1) Operation Modes

(a) Show Mode

(i) When in Show Mode the Operator cannot make or edit any changes to the show file of cue data

(ii) Show Mode can be selected by any authorized operator

(b) Edit Mode:

(i) When in Edit Mode the operator can set, program, create or record cues and edit show file data.

(ii) Edit Mode can be selected by any authorized operator

(c) Manual Move to Target

(i) This mode is intended to be a temporary cue screen. Cues are not saved but position and axis profile data can be copied into a cue.

(d) Manual Move to the Start of a Cue:

(i) When this mode is selected a cue is automatically created by the software to move all axes to the positions that they would be in at the beginning of the selected cue. Hoists that are required to

move shall be automatically selected. The operator may then choose to deselect hoists as desired in order to execute motion in any manner of their choosing.

(ii) The intention is to automate the cue writing process in order to speed up moves between cues during the rehearsal process

(iii) Out of sequence moves shall be highlighted in RED

(e) E-Stop Reset Mode:

(i) To prevent an operator from erroneously moving a hoist that may have been involved in an incident at potentially dangerous high speed, the software shall have a default E-Stop Reset Mode.

(ii) This mode shall automatically reduce the maximum speed of ALL MACHINERY in the system to no greater than 50% of maximum

(iii) Entering E-Stop Reset Mode

(a) When an Emergency Stop button is pressed the software shall by default enter the E-Stop Reset Mode

(iv) Exiting E-Stop Reset Mode

(a) The operator may choose to exit this screen upon command. Choosing to exit shall be met with a confirmation window reiterating that the operator has chosen to exit E-STOP MODE. The operator's choice shall be time stamped and logged.

(v) Configuring E-Stop Reset Mode

(a) E-Stop Reset Mode shall be configurable by the System Administrator and turned on or off as per the choice of the Administrator.

(b) When E-Stop Reset Mode is enabled the log files shall record the state of this setting when the program is opened.

(2) Views (Windows)

(a) Cue Data:

(i) Shall be presented in a clear and concise manner

(ii) When a cue is chosen the cue name shall appear at the top of the user screen

(b) Signal Views

(i) General:

(a) Signal views can be displayed on bitmaps

(b) Bars / Buttons / Graphs may be adjusted to any size or color

(c) Position of Bars / Buttons / Graphs may be adjusted and customized

(ii) Control Desk View:

(a) Provides details on Console Macros

(iii) E-stop View:

(a) Provides details on the location of depressed Emergency Stop buttons

(iv) Section view:

(a) A section view visual representation of the position of the axes within the system in relation to one another. Status and position data may be displayed near a graphic representation of the axis.

(v) Plan View:

(a) A plan view visually represents the location of axes in horizontal section. Status and position data may be displayed near a graphic representation of the axis.

(vi) Combined View:

(a) Combination of macro and signal view

(vii) Integrated 3D View

(a) At minimum the operator shall be provided with an accurately proportioned 3D wire frame view of the venue with wire frame objects that move in respects to the location of the actual elements in the system.

(b) This view may be used when the system is online or offline

(c) Operators may select axes from this view by clicking with a pointing device

(viii) Sequence View:

(a) A dedicated screen of functions that correspond with the lock sequence feature in Cueing below. Sequential buttons are displayed to the operator wherein buttons are only active once the preceding function has been executed.

h) Hold-To-Run (HTR)

(1) All consoles operating the Stage Machinery System must have a handle that is comfortable to hold in order for the system to be in an operable state (a.k.a. Dead-man)

(2) The HTR shall be held at all times to allow machinery to RUN

(3) Releasing the HTR shall initiate an EMERGENCY Deceleration (HTR Fault Stop) of all machinery in motion and bring all machinery to a safe stop

(4) The Stage Machinery Software shall have a timer that recognizes when the HTR is held and prevents an operator for defeating the action of the device

(a) The timer shall automatically initiate a HTR Fault Stop if it is not cycled within the prescribed amount of time

(i) A cycle shall be a press ON followed by timer initiation and a release to the OFF position

(b) The timer's time value shall be adjustable by the System Administrator. All changes to the timer shall be logged in the system logs

(c) The timer may be extended by direct action of the operator, pressing a HTR TIME EXTENSION button on console or on screen with the pointing device.

(i) A press of the TIME EXTENSION button shall provide the operator with an additional 60 seconds for each press of the button. This will allow the operator to extend the HTR timer for as long as needed.

(5) The switch managing the HTR system shall have 3 positions, OFF-ON-OFF

(a) Top Position (OFF) – Triggered when NO pressure is applied

(b) Mid Position (ON) – Active when pressure is applied. This is the ACTIVATED Operating Position

(c) Bottom Position (OFF) – Triggered when pressure greater than the Mid Position Requirement is applied.

(6) Contacts shall NOT close when released from the Bottom Position. Switch MUST be fully released to reset

(7) Position operating force:

(a) Position 1 to 2 – within  $\pm 5\%$  of 3N (approx. 0.67lbs)

(b) Position 2 to 3 – within  $\pm 5\%$  of 15N (approx. 3.3lbs)

(8) Circuit opening force from position 2 – 3 shall be 30N (approx. 7lbs)

(9) Status of the HTR shall be displayed at all times on the Operator Screen

(10) All actions of the HTR, HTR timer and HTR TIME EXTENSION shall be time stamped and stored in the LOG FILES

i) Cueing

(1) Cue Command Data:

(a) Shall be presented in measured units (feet, decimal feet, inches, meters, seconds, measurement value/sec<sup>2</sup>) or as a percentage

(b) Cue information should include:

(i) Axis Name

(ii) Axis Start position

(iii) Axis Target position

(iv) Axis Velocity

(v) Axis Acceleration

(vi) Axis Deceleration

(vii) Axis Cue Time

(viii) Axis Cue Start Delay

(2) Autofollow Cues:

(a) Time Based Trigger where the daughter cue follows the parent cue after a specific time period has passed from the point of the press of the GO button to execute the parent cue.

(b) Position Based Trigger where the daughter cue is triggered when the specified axis reaches the trigger position.

(c) Input based where a digital input triggers a cue event.

(d) Timeout

(i) To prevent accident execution of an autofollow cue in the event of the parent cue being stopped, the Stage Machinery Control Systems Software shall have the ability for the operator to enter a timeout period wherein the daughter cue is prevented to execute after the passage of the timeout period.

(3) Variable Speed Machinery

(a) When cueing variable speed machines the operator shall have the ability to set values for velocity, time, acceleration and deceleration

(4) Fixed Speed Machinery

(a) When cueing variable fixed machines the operator shall have the ability to set values for time, stop distance and slow zones (where applicable) to ensure accurate targeting regardless of changing loads.

(5) Machinery Without Position Control

(a) Where a machine does not have any position feedback the operator shall have the ability to set values for time.

(b) The Controller responsible for controlling such machinery shall stop the equipment on limit switch triggers.

(c) Where multiple limit switches are utilized the software shall have the ability to react to the additional limit inputs and execute an appropriate command (e.g. STOP)

(6) Machinery / Effects via I/O

(a) See Section A.11.e above

(7) Locked Sequences

(a) The software shall have the ability to provide locked sequences that can only be edited or unlocked by the system administrator once created by the operator and locked by the System Administrator

(8) Copy/Paste

(a) Cues may be copied and pasted as new cues

(b) Profiles from one axis may be copied and pasted as profiles of other axes. The technical parameters of the target axis may not be exceeded should the source axis have greater capabilities.

j) Presets / Named Positions

(1) The software shall have the ability to create named position targets on a global basis

(2) The software shall have the ability to override the named global position targets on an axis by axis



basis

(3) The software shall have the ability to create named target positions for each axis

k) Jogging

(1) The jog function must be enabled by the operator selecting a specific axis or group

(2) Once selected the operator may take control using the joystick to control the speed of the axis

l) Feed Rate / Speed Scaling

(1) The motion control software shall incorporate the ability to change the speed of any quantity of axes in motion by selecting the axes and changing a proportional speed value

(2) Speed scaling shall be programmable on a cue-to-cue basis allowing the operator to set a scaling value of less than 100% so as to allow the speeding up of a machine in motion on command

(3) Machinery may not be sped up to a value exceeding 100% of the device's designed maximum speed

m) Special Functions

(1) Complex Profiles:

(a) Provide the ability to program multiple speed changes, direction changes and acceleration / deceleration changes with the body of a single cue

(2) Repetitive Motion Profiles

(a) Provide the ability to program repetitive motion of an axis where it moves between two or more positions reversing direction or pausing at a specific position, without setting the brake.

(b) The feature shall be able to loop the sequence indefinitely by checking a selection box.

(c) Executing a new cue to send the axes in the looped sequence to a new target shall end the looped sequence.

(3) Grouping:

(a) The software shall be capable of grouping any number of hoists into a control group for the purpose of simplifying cueing

(i) Any fault within this group shall fault the others in the group bringing all hoists to a safe stop

(b) The software shall be able to synchronize any number of hoists into a control group and force the hoists to maintain a constant position tolerance between one another

(i) Should any one of the hoists in this group get out of position to a value greater than the programmed value the entire group shall fault and come to a safe stop

(ii) Any fault within this group shall fault the others in the group bringing all hoists to a safe stop.

(4) Pause and Resume

(a) If the STOP button is pressed the Software shall have the ability to enter into a PAUSE mode where all axes are stopped but can be sent back on their current cue path by pressing GO.

(b) When the STOP button is pressed a dialog box shall pop up providing the operator with the ability to select what axes they wish to continue OR press the STOP button again and cancel the PAUSE

(c) The default will be to select all AXES that were in motion when the STOP button was pressed for RESUME.

(d) This feature shall be part of the Applications Options and can be enabled or disabled by the System Administrator

(5) Constraints

(a) Provide the ability to constrain the motion of a specific axis based on:

(i) The position of any axis controlled by the software

(ii) A limit switch or input trigger from any axis or controller included with or controlled by the software

(6) Input devices

(a) The software shall accommodate various input devices including but not limited to:

- (i) Multiple encoders
  - (a) Incremental
  - (b) Absolute
- (ii) Multiple load cells and strain gauges
- (iii) Multiple switches and triggering devices

(b) Actions from these input devices shall include:

- (i) Error checking
- (ii) Faults within or exceeding user programmed tolerance levels
- (iii) Motion prevention
- (iv) Motion readiness

(c) GUI devices

- (i) Touch screens
- (ii) Keyboards / keypads
- (iii) Pointing devices
- (iv) USB multi-axis joysticks

(7) Conditional Moves

(a) The software shall have the ability to inhibit/fault, disable, restrict the motion or restrict the motion range of an axis based on specific criteria, such as:

(i) The position of a single axis or group of axes

(a) As an example: Axis-1 cannot move unless axis-2 and axis-3 are at a position greater than 'x'.

(ii) An analog signal

(a) A hoist that is being used to tension a cable cannot exceed a specified tension as read by a strain gauge whose signal is fed back into the system

(iii) A digital signal

(a) A limit switch or other digital device is monitored by the control software and restricts a hoist from lifting its load any higher

n) Macros

(1) The Console must include at minimum 10 programmable macro buttons as well as hard coded macro buttons that are preset to provide access to commonly used commands such as reset, mode select etc.

(2) The software shall have the ability to create an unlimited set of macros on a separate MACRO view Window. These macros are executed via a click with the pointing device that is provided with the console.

(3) Programmable macro features should include but not be limited to:

- (a) Speed set
- (b) Target set
- (c) Time set
- (d) Reset of group or axis
- (e) Cue select
- (f) Cue execute
- (g) Axis STOP
- (h) Output Activation
- (i) Additional macros as the supplier sees appropriate

o) Search Feature

(1) The Stage Machinery Control Software shall provide the ability to search for specific cues or groups of cues based on name or axis inclusions.

p) Additional Databases

(1) The software shall have the ability to utilize a database for specific search functions. An example would be a database of lighting circuits in a large studio that locates the batten on which a requested lighting circuit resides. The search may also automatically highlight or select the hoist(s) that move that batten in preparation for another operator function. This function MUST NOT automatically initiate ANY motion.

q) Restoring positions:

(1) The software shall have the ability to save and store the last known position of all axes on demand of the operator.

(2) All position information shall be backed up by each individual motion controller but should there be data loss the operator can then recall this stored position data and load it into the controller.

(3) Resetting of the data requires the operator's full attention and as such there must be a confirmation from the operator that the data being restored is true and correct.

(4) The action of the restoration of this data shall be logged in the log files.

r) Warnings

(1) The Software shall provide the following warnings

(a) Where an axis is not in the normal position for the start of a cue

(b) Where faults occur

(c) Timeout of the HTR handle

(2) The software shall provide the operator with the ability to create text boxes that illuminate in various colors and can be sized by the operator to demonstrate the state of an input or output that must be monitored for safety or other purpose.

s) Fault Reporting

(1) The software shall report a fault status to the operator in the cue information window

(2) The software shall have a separate window that allows the operator to view the specific status of faults in one complete view.

t) Logging of System and Operator Activity

(a) The software shall have the ability to record data of use and store it in a file with time stamping on a per action basis

(b) The files shall be created and saved automatically and be of a size that makes them easily emailed or transferred electronically

(c) The files must be protected from tampering so as to present an honest and true representation of the actions

(d) The software shall record all systems critical actions from a performance

(e) The log files shall record the user name and show file names that are opened and used

(f) Log files shall have a viewer that allows the operator to search specific files to locate specific actions, faults or changes

(g) The Operator shall have the ability to select certain input activities to be logged. Such as a limit switch.

u) File storage

(1) Files shall be stored in a root directory and accessible to the Operator for the purpose of creating backups.

v) File backups

(1) The software shall automatically save all necessary show related files on a regular basis.

- (2) A minimum of 5 rotating auto backups shall be saved.
- (3) The operator may restore their show file from any of these auto-saved files.
- (4) When exiting the program the operator shall be asked if they wish to save the show file. If they click "NO" the software will automatically save and store the last file and rename it as a backup while not affecting the user's current file.
- (5) The Operator shall use common Windows functions to copy files onto a USB memory stick from the software directory.
- (6) Where a network attached storage (NAS) or server device is required in a system automated backups shall be stored on this device as well.
- (7) The system should also be capable of being pointed to an offsite storage server via a secure connection.

w) Computer Hardware Redundancy

- (1) The software shall have the ability to configure a live tracking backup of the show file on a second computer
- (2) All files must be copied and saved to this backup computer in order to keep a carbon copy ready for use
- (3) The operator may be required to open the motion control program on the backup computer to activate the backup option
- (4) The motion control software must prevent both computers from simultaneously communicating and attempting to command controllers within the system so as to reduce the possibility of a communications error
- (5) During normal operation the backup computer's show file shall follow along with the operator's actions on the main computer
- (6) In the event of a computer hardware failure the backup computer must be in the same cue as selected by the operator at the time of failure
- (7) Files shall be automatically copied to the hard drive of the backup computer during normal operation

x) External Command Manager

- (a) The software shall have the ability to send and receive commands from 3<sup>rd</sup> party software
- (b) The software shall have the ability to send and receive data from a lighting console or other Stage Machinery Control Systems for external triggering or to transmit triggers to the 3<sup>rd</sup> party software.

y) Offline Visualization (Pre-Visualization)

- (1) The software shall be capable of connecting to a third party Pre-Visualization program such as WYSIWYG or ZOOM for the visualization of the motion of any axis or scenic element in an offline virtual presentation
- (2) Files shall be able to be shared with any other connected system with licensing permissions

z) Inter-Connectivity between other systems

- (1) The software shall be capable of connecting to a third party program that shares pre-described information via a discrete network such as CAST Software's BLACKBOX
- (2) Connection to this network must not affect the primary function of the motion control software
- (3) The motion control software shall be able to transmit and received data from the interpreter portion of the inter-connectivity system
- (4) The intent is to provide data such as position information to the interpreter in order to provide automated tracking of objects moved by the motion control software

aa) Performer Flying

- (1) The Supplier must have a policy for safe practices specific to the action of performer flying

- (a) Systems with pre-visualization of the Performer's flight path are preferred
- (2) Flight paths may be pre-programmed by plotting a path within the pre-visualization system or within the software
- (3) Flight paths may be 'taught' to the software through:
  - (a) the use of a joystick device that provides control over the 3D axes
  - (b) the use of a CAST Software BLACKTRAX programming/tracking wand
- (4) Error checking must be done by all hardware in the System to ensure the safety of the Performer and to provide safe stopping in the event of an error
- (5) All hoisting equipment must be controlled with closed loop control features that incorporate feedback loops to the drive as well as the motion controllers that are part of the Stage Machinery Control System
- (6) In the event of an encoder signal loss or corrupted encoder signal the hoist shall not run uncontrolled but instead the motor controller shall initiate a fault and safe stop
- (7) The editing of any flight path shall be performed within the motion control software.
- (8) All paths may be moved, shifted or scaled via simple keyboard commands or drag and drop
- (9) Algorithms for the coordinated movement of multiple hoists shall accept any quantity of hoists.

bb) Safety

- (1) The software shall perform safety checks when transmitting data to the controllers to ensure clean delivery of all motion profile information.
- (2) Where safety is a concern the system must have the ability to employ external warning devices to alert personnel of potential hazards.

cc) Documents and Reports

- (1) The software shall have the ability to export reports including but not limited to:
  - (a) Cue Data Sheets
  - (b) Controller Setup Information
  - (c) Axis Details

dd) Power Management

- (1) The software shall have the ability to manage power constraints of the building's infrastructure
- (2) Calculations to determine a potential overload of the system mains power will be performed at the time of cue execution. A warning window shall pop up indicating that the operator has programmed a cue or sequence that exceeds the FLA rating of the system.
- (3) The system shall be able to determine if the mains current is being exceeded at three levels:
  - (a) The local MCC cabinet mains
  - (b) The power distribution cabinet
  - (c) The mains assigned to the stage automation system
- (4) Software shall calculate demand based on total kW rating of the machinery at Full Load
- (5) Errors and responses shall be noted, time stamped and logged.

ee) Multiple Control Consoles

- (1) The software shall incorporate the ability to share common files.
- (2) A process of locking and unlocking or linking and unlinking of specific axes to a console shall be incorporated to prevent two separate operators from attempting to operate a single axis. An operator must first lock/link an axis to the console they are operating before they can move the machinery. Should another operator wish to access a axis they must first request the permission from the console that the axis is locked to. A process of inter-console messaging shall be used to send these messages between consoles.

ff) Network Storage – (Optional Feature – Not included in Base Project)

- (1) The system shall utilize a server or other means of Network Attached Storage (NAS) for file backup and centralization of administration databases.
- (2) Network storage or server systems may be added at any time at HFC's discretion. Adding this (these) device(s) will not incur any additional costs outside that of the hardware and services required for installation of same.

gg) Travel Restrictions and collision prevention

(1) Orchestra shell manager

- (a) The software shall incorporate a method of informing the system that an orchestra shell has been stored or deployed
- (b) Once the system knows the tilt angle of the orchestra shell the software will prevent or alarm any action that may cause a collision between the shell and itself

(2) Scenery Offset

- (a) There shall be a provision within the axis settings that allows the operator to input the dimension (along the travel axis) of a scenic element. This will allow the software to correctly identify travel restrictions and prevent a stage machine from driving its load into an obstruction.

(i) As an example... A scenic back-drop is loaded onto a lineset, raised to a height where the lower edge of the drop brushes the stage floor. The operator then enters the position data in one of the manners as described below

- (b) Inserting the dimension may be done by manually entering the data with an input device or by using a function key to enter the current position of a hoist

hh) Axis Profile Transfer

- (1) Profiles that have been entered into cues may be moved from one axis to another
- (2) A search tool shall search the cue database for all profiles entered for a specified axis and move them to another axis
- (3) Error checking must be employed to ensure that the profiles moved do not exceed the maximum motion parameters of the target axis
- (4) An option to leave a copy of the profiles on the source axis shall be made available to the operator but must be confirmed via a pop-up window that the "leave copy" function has been selected

ii) User Programmable Alarms

- (1) The software shall have the capability of accepting user entered programmable alarms
- (2) These alarms may be based on a variety of criteria, including but not limited to:
  - (a) Time
  - (b) Digital inputs
  - (c) Operator actions
  - (d) Axis location / position / proximities
- (3) Alarms may be annunciated via visual and / or audible means
- (4) Annunciation shall be user selectable
- (5) Audible alarms shall have a progressive volume feature
- (6) At minimum an audible alarm shall be present on the operator console in such a place as making it difficult to mechanically disable without the use of tools to open the console case or access a mechanically protected section of the console structure
- (7) At minimum visual alarms must be presented to the operator on one of their console displays (monitor screen)
- (8) Visual alarms may also be presented to the operator via external lighting
- (9) A window within the software shall display the following user input information:

- (a) The alarm
- (b) Description a the alarm
- (c) Description of the action required
- (d) Relevant importance of the action required

(10) Alarms shall only be silenced by direct action of the operator

(11) All alarms, actions taken and acknowledgements shall be time stamped, logged and recorded

jj) Audible and Visual warning devices

- (1) The software shall be able to initiate audible and visual warning devices as required
- (2) All warning devices shall be capable of being switched off during performances on a cue-to-cue basis by direct, logged and recorded action of the operator
- (3) When a device is turned off it must automatically reset to the active position and annunciate should the annunciation parameters be met at a later time
- (4) Under no circumstances shall an annunciator be permanently disabled, they may ONLY be temporarily turned off
- (5) Additional alarms may be employed on the operator's screen or console using visual methods of flashing lights, progressive volume buzzers or on screen indicators
- (6) Where the system employs these types of alarms all alarm annunciation devices shall include tamper resistant mechanical designs. Devices shall also be monitored for tampering by the motion control software

kk) Load Sensing

- (1) The software shall accept information from multiple load cells
- (2) Load sensing and monitoring shall be used to prevent overloads and underloads
- (3) When an overload or underload is detected the software shall fault the overloaded machine and any other machine within the group to bring all motion to a safe and controlled stop
- (4) In consideration that the load applied to a machine may change over the duration of a motion profile; the software may be "taught" a load profile in order to maintain an accurate minimum tolerance of the overload and underload monitoring feature
- (5) Load sensing must also take into account grouping of load cells to calculate total loads applied or carried by a machine or structure
- (6) Grouping of load cells must then fault on actions outside of the programmed trigger parameters of the group or of an individual within the group

ll) Software Upgrades

- (1) Software shall be upgraded on an annual basis at no cost to HFC for a period of ten (10) years.

mm) All wiring and terminations shall be provided by Contractor

G. Alternate Control System – Deductive Alternate from Base Project

1. Contractor shall provide an alternate deduct amountto provide a custom control panel to operate the Variable Speed front curtain

a) At minimum, this control panel would include:

- (1) Start Stop
- (2) Emergency Stop
- (3) Key Switch on/off

H. Digital potentiometer for speed control

I. Panel would be provided at location designated by HFC.

J. Delete Control System

K. Provide a deduct price to remove all controls related to the high speed front of House Curtain.

## **V. THEATRICAL RIGGING SYSTEMS**

### **A. INSTALLATION**

1. Equipment shall be installed by fully trained superintendents and workmen. Contractor shall employ Entertainment Technician Certification Program (ETCP) Certified theatre Riggers. Certified Riggers shall, at a minimum, be used as the project manager and site foreman and be responsible for the overall project including the layout, inspection, and onsite user training.

2. Equipment shall be installed per plans, specifications and approved submission. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.

3. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1). Structural Engineer shall be employed as required.

4. Alignment: Mule blocks, cable rollers and guides shall be installed, as required, to provide proper alignment, to maintain specified fleet angles, and to prevent contact with other surfaces.

Attachments: All equipment shall be securely attached to the building structure.

### **B. INSPECTION AND TESTING**

1. Inspection: During the installation of equipment Contractor shall arrange for access as necessary for inspection of equipment by HFC and its representatives.

2. System Pre-Testing By Contractor: On completion of installation, Contractor shall conduct a complete test of the system to ensure it is working properly and in conformance with this specification.

3. Completion Testing: Upon completing the installation, Contractor shall notify HFC and its representative, who will schedule inspection and testing of the full rigging system. At the time of testing, Contractor shall furnish sufficient workers to operate all equipment and to perform such adjustments and tests as may be required by HFC. All testing equipment, personnel, (including HFC's designated consultant) shall be at Contractor's expense. Any equipment, which fails to meet with approval, shall be repaired or replaced with suitable equipment and the inspection shall be re-scheduled under the same conditions as previously specified. At the time of these inspections, no other work shall be performed in the auditorium and stage areas. All temporary bracing, scaffolding, etc. shall be removed to permit full operation of, and access to, all equipment. Final approval will be withheld until all systems have been thoroughly tested and found to be in full working order and meets requirements herein. Should any of the testing fail to meet plans, specifications and submissions, then Contractor shall be responsible for arranging for repair and/or correction of the deficiency and the expense of arranging for a second inspection by HFC and its designated consultant.

a) Manual counterweight rigging shall be tested in accordance with ANSI E1.4 "Entertainment Technology Manual Counterweight Rigging Systems."

b) Powered rigging shall be tested. Each hoist shall be operated over five full continuous cycles at 1.25 times its full working load at full speed and travel distance. The emergency stop function shall be tested at 100% WLL in both the ascending and descending directions.

c) Demonstrate that all over-travel limit switches have been correctly set for the actual field conditions of the specific project.

d) If it applies to the project, demonstrate that all position encoders have been correctly set for the actual field conditions of the specific project.

e) Provide written recommendations to HFC for necessary repairs or changes not included in the warranty. Provide a copy to the rigging equipment Manufacturer and in the Operations Manual.

4. HFC shall witness and sign off on the inspection. A copy of the certificate shall be included in the permanent log turned over to HFC.

### **C. INSTRUCTION**

1. Upon completion of the work, Contractor shall submit 5 copies of a comprehensive Operating and Maintenance Manual including as-built shop drawings, equipment descriptions, and parts lists. Contractor shall provide a safety and instruction class with personnel designated by HFC to demonstrate and explain the operation and maintenance of the systems.



2. Signage with basic operating instructions and warnings shall be posted in the area where the equipment will be operated. Signage shall be in conformance with ANSI-Z535.

#### D. FOLLOW-UP INSPECTION

1. One year after the completion of installation Contractor shall return to the site, and provide the following services at Contractor's expense:

2. Perform a complete inspection of the rigging system in accordance with OSHA 29 CFR 1926.550 Cranes and Derricks, 1926.550(a)(6).

3. Make all required adjustments.

4. Correct all warranty items and provide a written report to HFC, Manufacturer and consultant.

5. Provide written recommendations to HFC for necessary repairs or changes not included in the warranty. Provide a copy to the rigging equipment Manufacturer and the consultant.

6. Conduct a 1-hour rigging operation and safety class.

7. Provide a written proposal for the next year's maintenance visit.

8. This inspection shall be conducted annually at the expense of Contractor during the 5-year warranty period.

9. At the end of the year 4 inspection, provide HFC w/ a quotation for annual inspections and routine maintenance on an ongoing annual basis.