SECTION 11 61 33 - STAGE RIGGING AND DRAPERY SYSTEMS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. For the sake of brevity these specifications omit phrases such as "(Sub)Contractor shall furnish and install," "unless otherwise indicated or specified," etc., but these phrases are nevertheless implied. Mention of materials and operations requires the (Sub)Contractor to furnish and install such materials and perform such operations complete to the satisfaction of the Architect's Consultant. Exceptions are noted herein or shown on the drawings.

B. No representative of the Owner shall have power to waive the obligations of this contract for the furnishing of good materials or of performing good work, as herein described, in full accordance with the contract documents. The failure of any representative of the Owner to condemn any defective work or materials shall not release the obligation to at once tear out, remove, and properly replace the same at any time prior to final acceptance upon discovery of said defective work or material. When requested, however, the Owner's representative shall observe and accept or reject any material furnished. In the event the material has been accepted once by the Owner's representative, such acceptance shall be binding on the Owner unless it can be clearly shown that such material does not meet the specifications for this work.

C. All equipment and installation shall be the responsibility of a single contractor. This Contractor shall assume complete responsibility for the engineering, fabrication, transportation, and installation of the work in this Section.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to work of this section.

B. Refer to Contract Drawings TR series for plans, graphic representations, schedules, and notations showing Stage Rigging System work.

1.3 SCOPE OF WORK

A. Work under this section shall include the furnishing of all labor, materials, tools, transportation, services, and supervision necessary to complete the installation of the Stage Rigging System and other items as herein listed, all as described in these specifications, as illustrated on the drawings, and as directed by the Architect's Consultant. Any question as to the installation of equipment should be cleared with the Architect's Consultant prior to installation. Work is comprised of, but not limited to, the following principal items:

1. Line sets, arbors, wire rope, battens, hardware, chain, blocks, etc.,
2. Stage curtain,
3. Installation of cable saddles for electrical cables,
4. Mounting of existing plugstrips to new battens,
5. Installation of manual winch and clew,
6. Miscellaneous steel for mounting equipment,
7. Miscellaneous components and parts herein specified,
8. Portable and loose equipment,
9. Cleaning and removing dirt and dust from gridiron,
10. Dead hanging an existing partition wall,
11. Construction and installation of new partition wall door,
12. Install LED index strip lighting and controls,
13. Installation of existing portal reduction panels,
14. Proof of performance testing

B. Furnish and install complete Stage Rigging System with all necessary apparatus, equipment, wiring, etc., required to insure complete systems in excellent working order as specified herein and on the attached diagrams.

C. Consistent with the detailed information contained herein and on the drawings, provide functional and complete overall systems. Verify complete parts lists, the accuracy of the type numbers, and the overall suitability of the equipment to produce complete functional systems coordinated and interfaced with related work.

D. Minor items of equipment needed in order to meet the requirements stated above, even if not specifically mentioned herein or on the drawings, shall be provided in quality equivalent to other conditions on the project with no claim for additional payment.

E. Coordinate with related work provided under other sections:
   1. Fire protection systems
   2. Stage lighting system
   3. Lighting plugging devices
   4. Building structure
   5. Ductwork

1.4 JOB CONDITIONS

A. Coordinate layout and installation of rigging with other adjacent work, including structural, light fixtures, HVAC equipment, plumbing, and fire-suppression elements.

B. Verify all conditions on job site applicable or pertaining to this work. Coordinate with scheduled work of other trades. Notify Architect’s Consultant in writing of discrepancies, conflicts, or omissions prior to commencement of work or correct the same at Contractor's expense.

C. The drawings show diagrammatically the arbors, sheaves, running lines, controls, etc. So far as possible the drawings show arrangement of equipment that will fit into the spaces available without interference. If conditions exist at the job site that make it impossible to install work as shown, prepare and submit drawings to the Architect’s Consultant for approval showing how the work may be installed, and, on approval, install the work without additional cost to the Owner.

D. Contractor shall take care not to damage any equipment or to disconnect any wiring other than as required to interface new system. Any contractor-damaged equipment shall be repaired or replaced by the Contractor at no additional cost to the Owner. Return any systems disturbed during work to found condition.
E. Deliver materials to the job site such that they will be protected from damage. Store all materials at building site under cover.

1.5 APPROVED FABRICATORS

A. The hoists, motors, hardware and related components specified herein shall be fabricated by the following:

- J. R. Clancy, Inc., 7041 Interstate Island Road, Syracuse, New York, 13209
  http://www.jrclancy.com/

- Protech, 3431 N. Bruce St., North Las Vegas, 89030
  http://www.protechlv.com/

- SECOA, 8650 109th Ave. N., Champlin, MN 55316
  http://www.secoa.com/

- Texas Scenic Company, 5423 Jackwood Drive, San Antonio, Texas, 78238
  http://www.texasscenic.com/

- Hall Stage Limited, Unit 4, Cosgrove Way, Luton LU1 1XL, UK
  http://www.hallstage.com/

- H & H Specialties, Inc., 2203 Edwards Avenue, South El Monte, California, 91733
  http://www.hhspecialties.com/

- Rigging Innovators, 7819 Fortune Drive, San Antonio, TX 78250
  http://www.rigginginnovators.com/index.html

- Tiffin Scenic Studios, Inc., 146 Riverside Drive, Tiffin, Ohio 44883
  http://www.tiffinscenic.com/

B. The draperies and related components specified herein shall be fabricated by the following:

- J B Martin Corporation, 645 5th Avenue, Suite 400, New York, NY 10022
  http://www.jbmartin.com/

- KM Fabrics, Inc., Box 7379, Branwood Station, Greenville, SC 29610

- I. Weiss & Sons, 2-07 Borden Ave., Long Island City, NY  11101
  http://www.i-weiss.com/

- Rose Brand, 424 W 33rd St, New York, NY 10001
  http://www.rosebrand.com/

- SECOA, 8650 109th Ave. N., Champlin, MN 55316
  http://www.secoa.com/

- Stage Decoration & Supplies, Inc., 3519 Associate Drive, Greensboro, NC 27405
  http://www.stagedec.com/

- Syracuse Scenery & Stage Lighting Co., Inc., 101 Monarch Drive, Liverpool, NY 13088-4514
  http://www.syracusescenery.com/
C. The track, track hardware, and related components specified herein shall be fabricated by the following:

Automatic Devices Company, 2121 South 12th Street, Allentown, PA 18103
http://www.automaticdevices.com

Hall Stage Limited, Unit 4, Cosgrove Way, Luton LU1 1XL, UK
http://www.hallstage.com/

H & H Specialties, Inc., 2203 Edwards Avenue, South El Monte, CA 91733
www.hhspecialties.com

Richards-Wilcox / 600 South Lake Street / Aurora, Illinois 60506
http://www.rwhardware.com/

1.6 RIGGING CONTRACTOR QUALIFICATION

A. Qualified rigging contractors shall have been actively engaged in the sales and installation of theatrical rigging systems and equipment for a minimum of five years. In addition, the qualified contractor shall have completed a minimum of three projects of similar scope and magnitude within the last five years. Contractors not demonstrating this minimum experience at the time of bid submission will not be considered qualified to perform the work specified in this section.

1.7 SUBSTITUTIONS

A. Notwithstanding any reference in the specifications to any article, device, product, materials, fixtures, form, or type of construction by name, make, or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect’s Consultant expressed in writing, is equivalent to that specified.

B. All materials and equipment specified herein have been determined to provide an overall physical appearance and background of proven operation desired by the Owner, and therefore, to establish a standard of quality required for this project. If equipment or material other than that specified is proposed to be furnished, this Contractor shall be required to furnish the Architect’s Consultant with such samples as he requires, the same to be submitted by the Architect’s Consultant to an independent testing laboratory selected by the Owner for tests to determine the actual equality of the proposed substitute items. All costs and charges incurred by these tests shall be borne by the Contractor. Should such tests prove the substitute materials and equipment equal and acceptable, the Contractor shall be so advised. However, the Owner reserves the right to examine, and where necessary, to have additional tests made by the same independent testing laboratory of the actual equipment delivered to the job site to insure that the delivered equipment is equal in fact to that specified. Should such secondary tests prove the equipment is satisfactory, the Owner will pay the cost for such tests. Otherwise, the Contractor shall pay for the test and shall proceed...
to remove unacceptable equipment from the job site and to provide that specified. The Architect’s Consultant's decision, based on this test, will be final.

C. The plans and specifications are based on specific equipment, accessories, processes and arrangements as indicated herein. Acceptance of the shop drawing submittal indicates only the acceptance of the manufacturer and quality and assumes that the specific requirements and arrangements are in compliance with the intent of the plans and specifications. The Contractor shall, at no additional cost to the Owner, furnish all accessories, layouts, equipment, etc., and shall perform all work necessary for proper functioning and to fit his substitute items to the intent and arrangement indicated in the specifications.

D. If a substitute system is selected, the Contractor, at no additional cost, shall provide any changes in architectural, electrical, or structural systems required as a result of the alternate system to the Owner. The decision of the Architect’s Consultant as to the compliance of the proposed system based on the submitted data and demonstrated system shall be final.

1.8 SHOP DRAWINGS AND SAMPLES

A. Shop drawings and equipment data sheets shall be submitted to the Architect’s Consultant in accordance with the requirements of these specifications within 90 days after award of the contract. Failure to comply with this 90-day requirement shall be cause for disqualification of the Contractor and cancellation of the contract without cost to the Owner on the basis that the Contractor has not demonstrated the ability or intention to comply with the Contract Documents.

B. Prepare all shop drawings under the supervision of a professional structural engineer so licensed by the state of the installation. All shop drawings shall be stamped and certified by said engineer. Structural Engineer's review shall include, but not be limited to, all elements related to overhead lifting, structural support of elements and all suspended elements provided under this section.

C. Acceptance of submitted equipment shall be obtained prior to equipment purchasing or fabrication. If shop drawings are rejected, correct and resubmit in the manner as specified. All shop drawing information shall be submitted at the same time; no partial submittals will be reviewed. Review is for conformance with design intentions only. Review does not relieve contractor of responsibility to verify field conditions; nor does it relieve the contractor of responsibility for errors, omissions, or deviations in submittals.

D. The Contractor assumes responsibility for the accuracy of all dimensions and quantities.

E. Shop drawings shall be performed at a scale of not less than 1/4" = 1'-0" for plans and sections and 1" = 1'-0" for details. Drawings and catalogs shall be marked to show the name of project, date, Owner, Architect’s Consultant, Contractor and/or manufacturer and supplier.

F. Drawings: Submit three (3) sets of drawings for review. Drawings shall indicate complete details and dimensions of all work to be performed. Include all equipment types and locations, clearances required, guides, chains, line sets, contractor-fabricated equipment and all other details required to describe work to be performed. Shop drawings shall contain at least the following details:

1. Groove details for all sheaves and drums
2. Complete rigging schematics with weights of all equipment
3. Complete hanging/attachment details
4. Complete hardware details
5. Weights of all equipment
6. Schematic diagrams of all electrical work including motorized hoists
7. Manufacturer’s data sheets
8. Indication of all variance from contract drawings

G. Catalog Sheets: Submit **three (3)** copies of catalog data sheets (8-1/2” x 11”), neatly bound in sets with title page, space for submittal stamps, and tabbed dividers between sections. Additional copies of this set of data sheets are required with as-built drawings. Catalogs shall contain data sheets, in proper order, on all equipment proposed with part or model number clearly indicated. Provide a complete list of proposed equipment with reference to its corresponding specification section/paragraph number or equipment title. Denote all deviations from specified equipment on the list.

H. Fabric Samples: Submit a sample of curtain material.

1.9 RECORDS FOR OWNER

A. Drawings: Maintain a full record set of drawings on the job to show the actual installation of the work performed. Submit four (4) hard copy sets of drawings and four (4) CDs of electronic copy in PDF format showing 'as installed' work to the Architect’s Consultant for initial review. If 'as installed' documents are rejected, correct and resubmit in the manner specified.

B. Manuals: At the time of project closeout, submit four (4) sets each of the following manuals to the Architect’s Consultant for review. Manuals (8-1/2” x 11”) are to be neatly bound and include title page with the name of the project, date, Owner, Architect’s Consultant, Contractor, Contractor and/or Manufacturer and Supplier. The manuals to be supplied are as follows:

1. Operation and Instruction Manual, including:
   a. Table of contents
   b. Brief description of the operation of each system, (descriptions shall be written such that new personnel may read the manual and be able to set-up and operate the system).
   c. Manufacturer's operation instructions for all user-operated equipment.
   d. Small scale, clear laminated plan(s) showing the location of all equipment.

2. Maintenance Data Manual, including:
   a. Table of contents
   b. A list of all equipment supplied by this contract with manufacturer's name, model and part number.
   c. A listing of equipment manufacturer's/supplier's addresses for all equipment covered by this contract.
   d. All equipment warranties and guarantees including contractor's guarantee. Explain the limits of the warranty, and whom to contact for service.
   e. Manufacturer's owner and service manuals on all equipment under this contract.
   f. Replacement parts lists of all major items and equipment indicating specific part ordering numbers.
   g. Approved shop drawing catalog data sheets.
   h. All test results required under these specifications. Videos shall be submitted in DVD format.
   i. Any and all other data and/or drawings required during construction.

1.10 TESTS AND OBSERVATIONS
A. The complete job shall be, during and/or after construction, subject to the following observations:

1. By Architect’s Consultant observations in their presence. Upon notice, Contractor shall furnish not to exceed two (2) persons (one to be the job foreman) and tools to assist for a reasonable amount of time to make such observations as are requested by the Architect’s Consultant.
2. By any Government or local authority.
3. Operation and visual examination of all components.

B. After completion of installation and preliminary tests by the Contractor, observation of the work shall be performed by the Architect’s Consultant. The cost of periodic trips to the job site for final observation by the Architect’s Consultant has been provided for in the Architect’s Consultant's contract. The cost of any additional trips to the job site due to delays, omissions, or mistakes by the Contractor shall be borne by the Contractor.

1.11 GUARANTEE

A. All labor and materials provided under this contract, unless otherwise noted, shall be guaranteed for a period of one (1) year following the date of final acceptance of the installation.

B. All equipment with factory warranties greater than one year shall have their warranties under the Owner's name.

C. All defects occurring in labor or materials within the guarantee period shall be rectified by replacement or repair. Contractor shall, within this guarantee period, be required to answer all service calls within a 24-hour period and repair or replace any faulty item within 48 hours after the initial service call without charge to the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall be new and of first quality. All equipment shall be manufactured and installed in accordance with applicable standards of the National Electric Code (NEC), American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), American Institute of Steel Construction (AISC), the National Fire Protection Association (NFPA) and the National Electrical Manufacturers Association (NEMA) plus any and all local governmental or other applicable codes.

B. All load bearing rigging components shall be rated for overhead lifting; capable of supporting design loads as shown with minimum design factor of eight (8); and shall be of, or treated with, corrosion resistant materials.

C. The rigging products of certain manufacturers are specified by catalog number for establishing a standard of quality. Items equal in quality and performance by manufacturers other than those specified will be permissible upon acceptance by the Architect’s Consultant.

D. Equipment quantities are "as required" or "as shown on drawings" or "as specified elsewhere" unless otherwise noted.
E. Loading capacities of systems, where specified in the Drawings or the Specifications, refer to the net working payloads exclusive of the dead loads – pipe battens, truss battens, sandbags, hooks, plugstrips, etc. – exactly as indicated on the Drawings and Specifications. Should the Contractor choose to suggest alternate methods that require heavier loads, the Contractor shall be responsible for increasing the capacities of the individual components, including the arbor capacities, accordingly. Any alternate methods must be approved specifically by the Architect’s Consultant.

2.2 ARBOR GUIDE SYSTEM

A. T-track system shall be 1-1/2" x 1-1/2" x 3/16" steel or 2" x 2" x 1/4" aluminum tees, or jays, spaced as shown on the Drawings. Tees shall be Clancy type 1500 with appropriate number of Type 215 or 315 U Plates. All spreader U plates shall be bolted to continuous angle wall battens. 1-3/4" x 1-3/4" x 3/16" steel angle wall battens shall be mounted 5'-0" apart vertically over the entire area of the arbor guide battery. Both legs of the wall battens shall be slot punched to provide for any alignment of the tees made necessary by irregularities in the wall. The tee bar shall also be slot punched in order to provide for vertical alignment of the guide system. Tees shall extend upward to underside of head block beams. Top and bottom stops of hardwood bumpers with steel angle backing shall be provided to control limits of arbor travel. The top and bottom stop battens and the floor batten shall be secured to the tee bar, and the 3" x 6" floor batten shall be secured to the floor by means of 3/8" x 2" lag screws. Provide adjustable stops on tees, or jays, to limit upward travel of tension blocks. Any splices in T-track must be smooth and free from any burns, or notches that could catch arbor shoe.

2.3 ARBOR

A. For single purchase T-track system, arbor shall be mounted between tees, or jays, to accommodate counter-weights. Arbor top and bottom is to be a fabricated steel weldment of 1/4" plate formed into a channel with 3" sides and is to be properly fitted to receive the required number of cables. The top and bottom of the arbor shall be tied together by means of two 3/4" rods which shall be threaded at each end to accommodate the below mentioned nuts. Each rod is to have two 3/4" nuts above and one below the arbor top and one above and two below the arbor bottom. Each rod shall be equipped with one retaining collar with thumbscrew (no tools required) to lock weights in place. Arbors shall also be equipped with sliding spacers, one (1) for every 2'-0" of arbor height equal in width to bottom of arbor. The arbor shall be equipped with a ½" x 3" steel tie bar that is bolted between the arbor top/bottom and the guide shoe assembly. Arbor shall accept required number of hoist lines. Arbors utilizing cast materials are not acceptable. Arbor backbone shall be painted to show 1'-0" increments.

B. Approved Equipment:

1. J.R. Clancy, Inc. Model No. 007-15x
2. H & H Specialties, Inc. Model No. 990

C. Quantity: One per counter-weight line set.

2.4 ARBOR GUIDE

A. At each end of the arbor there shall be a ball bearing roller guide assembly. Each assembly shall consist of the following: Two 3 ½" Nylatron GS guide wheels; 6-3/8" x 3" x 3/16" steel back-up plates. Each guide assembly shall be secured to the tie-plate and the top and bottom of the arbor by means of at least two 3/8" grade 5 bolts and nuts.
B. Approved Equipment:

1. J.R. Clancy, Inc. 007-TBRG
2. H & H Specialties, Inc. Model 991RG

2.5 LOCKING RAIL

A. Locking rails for the arbor guide system shall be fabricated as shown on drawings and shall consist of the required steel angles, braces, etc., to facilitate the mounting of one rope lock for each line set and a pin rail for hanging plug box rope sets. Provide a Lamacoid tag permanently attached at each line set, identifying it by number, with space to write on for identifying equipment placed on the line set. Provide adjustable stops for tensioning floor blocks on the tees, or jays, to limit upward travel of each take-up block. Provide a 2" x 2" hardwood arbor stop mounted to the top back steel angle. The locking rail shall be designed and installed in such a way as to resist a maximum uplift of 500 pounds per linear foot of locking rail as mounted to the floor. This shall be accomplished by use of an expansion or adhesion anchor into the concrete floor installed per anchor manufacturer’s instruction. When unable to anchor to concrete, anchor in manner which shall meet the loads specified above.

B. Provide pin rail attached to front of locking rail.

C. The pin rail shall be manufactured from one 6” I.D. black steel pipe, ASTM A53/A Strong (Schedule 40). Holes for belaying pins shall be on 12” centers.

D. Approved Equipment: Atlas Silk 578 (modified for pin rail)

E. Quantity: As shown on drawings

2.6 ROPE LOCK

A. Rope lock shall be positive locking, quick-release type with thumbscrew adjustment for rope size. Body shall be fabricated of heavy-duty ductile iron. Jaws shall be fabricated of gray iron, and sized to fit specified arbor control line. Rope lock shall have 9" steel handle encased in plastic. Rope lock ring shall also be encased in plastic. Rope lock and rope lock handle shall be smooth finished and free of all cast flashing and sharp edges. Provide rubber bumper for the handle to land on when opened and spring washers between the dogs and the house to provide silent operation. Provide one rope lock per counter-weight set.

B. Approved Equipment:

1. J.R. Clancy, Inc. Model No. 533R
2. H & H Specialties, Inc. Model No. 576-9

C. Quantity: One per counter-weight line set per locking gallery.
2.7 FLOOR BLOCK

A. Floor block on T-track for tensioning arbor control line. Sheave shall be 10” with 5/8” SAE Grade 2 or better steel shaft and sealed precision ball bearings. Bottom half of sheave shall be completely enclosed in block assembly. T-track guide assembly shall consist of two steel shoe guides and one spacer. Each line set shall be installed with respective floor block on the T-track at ½ way up their total travel to allow for stretch of arbor control line. Tension blocks will be re-adjusted, as needed, before final checkout. Rope groove shall be sized for specified arbor control line, smooth finished and free of all cast flashing. Minimum weight of block shall be 40#.

B. Approved Equipment:
   1. J.R. Clancy, Inc. Model No. 1015
   2. H & H Specialties, Inc. Model No. 70

C. Quantity: One per counter-weight line set.

2.8 HEAD BLOCKS

A. Head blocks shall have one sheave of sufficient width to accommodate required number of wire rope grooves and one arbor control line. Sheave shall conform to cable manufacturer's recommendation on depth and design of grooves and shall have 1/64” tolerance. Pitch diameter from any wire rope groove to any other shall not vary by more than .001”. Head blocks shall be equipped with life-time lubricated Timken tapered roller bearings. The shaft shall be SAE Grade 8 steel bolt with head keyed to prevent shaft rotation. Insert steel sleeve into bore to provide bearing surface for roller bearings. Head blocks shall be equipped with at least 3 spacers of 1/2” pipe to prevent jumping of wire rope from the grooves. Side plates shall be at least 10 gauge securely welded to base frame with a continuous staggered weld. Provide base angles and auxiliary base angles as necessary for support to structure. Fasteners shall be SAE Grade 5 or better.

B. Sheave Material: Nylatron GSM

C. Sheave Diameter: Standard Rigging - 12"

D. Minimum Shaft Diameter: Standard Rigging - 1"

E. Approved Equipment:
   1. J.R. Clancy, Inc. Series 55
   2. H & H Specialties, Inc., Series 50

F. Quantity: One per counter-weight line set

2.9 LOFT BLOCKS AND MULE BLOCKS

A. Loft blocks and mule blocks shall have one sheave (mules may require more than one sheave) of sufficient width to accommodate required number of wire rope grooves. Sheave shall conform to cable manufacturer's recommendation on depth and design of groove and shall have a 1/64" tolerance. Pitch diameter from any groove to any other shall not vary by more than .001”. Blocks shall be equipped with life-time lubricated, sealed bearings as specified below. The shaft shall be SAE Grade 8 steel bolt with
head keyed to prevent shaft rotation. Blocks shall be equipped with at least 2 spacers of 1/2" pipe to prevent jumping of cable from the grooves. Side plates shall be at least 10 gauge securely welded to base frame with a continuous staggered weld. Provide base angles as necessary for support to structure. Fasteners shall be SAE Grade 5 or better. Provide idlers on each block with sufficient number of sheaves to support passing wire rope on each loft block.

B. Approved Sheave Material:
   1. NYLATRON GS
   2. ZYTEL GRZ

C. Sheave Diameter: Standard Rigging - 8"

D. Bearings:
   1. Standard Rigging Loft Blocks - Precision Ball Bearings
   2. Standard Rigging Mule Blocks with two or less lines - Precision Ball Bearings
   3. Standard Rigging Mule Blocks with three or more lines - Sealed Timken Tapered Roller Bearings

E. Minimum Shaft Diameter: 5/8"

F. Approved Equipment:
   1. Upright Loft Block: Atlas Silk Series 40NS
   2. Underhung Loft Block: Atlas Silk Series 42NS
   3. Pivot Loft Block: Atlas Silk Series 44NS
   4. Underhung Swivel Loft Block: Atlas Silk Series 46NS
   5. Upright Mule Block: Atlas Silk Series 80NS
   6. Underhung Mule Block: Atlas Silk Series 81NS

G. Quantity: Refer to drawings and as required

2.10 WIRE ROPE

A. Wire rope shall be first quality, galvanized carbon steel, and impregnated with a dry lubricant. All cable ends shall be neat, seized and smoothed to prevent scratching and catching. Wire rope shall be terminated with cable thimbles and utilize one of the following termination methods:
   1. Nicopress sleeves as manufactured by National Telephone Supply, applied in conformity with manufacturer's instructions.
   2. Forged wire rope clips as manufactured by The Crosby Group, Inc. (Crosby® Clips), applied in conformity with manufacturer's instructions.

B. Wire Rope Diameter:
   1. Standard Rigging – 1/4"

C. Approved Equipment:
   1. Hoist and Rigging – Macwhyte 7 x 19 Utility Cable
   2. Guide – Macwhyte 7 x 7 Non-Flexible Utility Strand
2.11 HOIST LINE TERMINATION ASSEMBLIES - WIRE ROPE

A. Batten termination

1. Type 1 – Wire rope shall be as specified elsewhere or as shown on drawings and fitted with rated jaw-jaw turnbuckles. Type 1 terminations will be installed on all double batten line sets unless otherwise noted.

B. Arbor terminations - Wire rope shall be terminated as specified elsewhere and fitted with an appropriately sized, Grade 8 bolt passed through the arbor top.

2.12 CHAIN

A. Dead hanging battens and batten termination assemblies (trim chains).

1. Each chain shall be 36-inches long fabricated from 1/4-inch alloy Theatrical Chain, specifically designed for theatrical overhead lifting applications.
2. The chain shall have a minimum breaking strength of 13,000 pounds.
3. The chain shall be compatible with industry-recognized chain hardware. Individual link size shall match the National Association of Chain Manufacturers, Welded Steel Chain Specifications for Grade 30 Proof Coil Chain.
4. Each link of the chain shall be stamped with the manufacturer’s identifying mark.
5. The chain shall be lot traceable, with a coded date stamp on every tenth link of chain.

B. Approved product:

1. J.R. Clancy Alpha Chain
2. SECOA STCT™ Chain

C. Fire curtain safety anchor.

1. Approved Equipment: Crosby 3/8" SAE Grade 4 high test

2.13 CHAIN TERMINATIONS

A. Shackle for termination of dead hanging chain and hoist line terminations (trim chains).

B. Approved Equipment: Crosby Load Rated Forged Screw Pin Anchor Shackle.

C. Shackles shall be “moused” shut with wire, after proper installation.

D. Quick link for termination of certain special components. Quick links may only be utilized when specifically indicated herein or on drawings.

E. Approved Equipment: Cooper Group Rapid Link load rated at 880 lbs.
2.14 Battens

A. Pipe battens shall be nominal 1-½" I.D. black steel pipe, ASTM A53/A Strong (Schedule 40 and Schedule 10), stripped and painted with at least one coat of black primer and one coat of flat black paint free of surface irregularities, in lengths as indicated on rigging schedule.

B. Splices shall be close-fitting internal steel sleeves with a wall thickness of not less than 0.1875 inch, and min. 24 inches long. Both sides of the splice shall be held in place with a minimum of two (2) plug welds per side.

C. All battens shall be painted for 24" on each end with bright yellow enamel for visibility in the loft. Line set number shall be stenciled on each end of each batten, in contrasting color paint, such that the number is readable from the floor when the pipe is flown out and from position upstage of the batten when the pipe is flown in.

D. Paint on every batten a 1” wide strip at center stage of the batten.

2.15 Pipe Clamps

A. Clamps shall be sized to connect to 1-1/2” (1.9” O.D.) black steel pipe.

2.16 Fiber Rope

A. Fiber rope shall be a synthetic rope consisting of combination filament and staple/spun polyester wrapped around fibrillated polyolefin.

B. Fiber rope diameter:

1. Grand Drape – 1"
2. All other counterweight sets – ¾"
3. Hanging plug boxes – ¼” provided in length to allow plug box to extend full length of SO electrical cable and still make three wraps on the pin rail.


2.17 Belaying Pins

A. Hardwood pin, 21” long by 1-5/32” diameter.

B. Approved Equipment: JR Clancy 015-249.

C. Quantity: One for each hole in pin rail.

2.18 Counterweight

A. Counterweight shall be first quality mild steel bar stock, with U-shaped slots flame-cut into the ends to fit arbor rods. All edges shall be ground free of burrs and rough or sharp edges.
B. Weights shall be six (6) inches in width. Contractor shall provide weights in two thicknesses that correspond to approximately 40 pounds and 20 pounds.

C. Counterweights shall be chamfer-cut on two opposing corners.

D. Provide balance weight for all line sets using primarily 40-pound weights. Balance weights shall be painted red and seized to the arbor bottom with two bands of standard mechanically locked steel strapping. On the front face of the top dead weight, paint the set number in white, using stenciled numerals not less than 1/2" high.

E. After balancing, provide additional weight equal to 60% of the total arbor capacity of all installed line sets. Additional weight shall consist of the following percentages, by weight:

1. 40 pound: 75%
2. 20 pound: 25%

F. Additional weight shall be delivered to the Loading Gallery.

2.19 MISCELLANEOUS COMPONENTS

A. Special components may be required for muling around structural components to meet wire rope fleet angle requirements, supporting hoisting cable, or dropping lines through structure to battens. These special components shall meet or exceed comparable equipment specified herein. Idler blocks, pivot blocks, structural support for these blocks, etc., required to make all lines fully operable, whether such components are specifically named or not, shall be furnished without claim for additional payment.

2.20 CURTAIN FABRICS

A. Refer to drawings for new curtain sizes and quantities. All fabrics shall be first quality. All fabrics shall be produced from one dye lot per color. Color quality shall be consistent throughout, with no visible streaking, striping, or spotting.

B. Approved fabric for Fire Curtain:

1. Canvas Specialty Co. #CSC-G2WC
2. Zetex 1210-ZP with wire

C. Fabric for Grand Drape and Valance curtains shall be 32-ounce combed velour. Color shall be selected by Architect. Approved fabric manufacturers:

1. KM Fabrics
2. JB Martin

D. Fabric for borders, legs, black out drapes and traveler curtains shall be 25-ounce synthetic velour. Color shall be black. Approved fabric manufacturers:

1. KM Fabrics
2. JB Martin
3. I. Weiss & Sons
E. Fabric for scrim curtains shall be black sharkstooth scrim. Color shall be black. Approved fabric manufacturers:

1. Rose Brand
2. Dazian Fabrics

F. Fabric for Cyclorama shall be seamless cotton. Color shall be bleached white. Approved Fabric:

1. Rose Brand Seamless Translucent Muslin
2. Gerriets international Shirting Bleached Muslin

G. Fabric for Heat Stop Border curtains shall be 26-ounce heat resistant fabric. Color shall be black. Approved Fabric:

1. Canvas Specialty Co. # CSC-G2P
2. ZetexPLUS 800

H. Approved jute upholstery webbing for top of curtains: Dazian 3-1/2" Wide #115062

2.21 HEAVY DUTY SCENIC TRACK

A. For the purposes of establishing a standard of quality desired, scenic tracks and certain other products of Richards-Wilcox / 600 South Lake Street / Aurora, Illinois 60506,P: 800-253-5668 / F: 630-897-6994 /, have been used in this specification and in the drawings.

B. Refer to Drawings and Rigging Schedule for equipment types, sizes and quantities.

2.22 INDEX STRIP LIGHT

A. Provide Index Strip Light as shown on drawings. Fixture to be hung by chains as shown on drawings. Provide two circuits of LED strip lights, one blue and one white. Mount controller at stage level.

B. Acceptable manufacturers: Lumenesce Rail-Lite Index Strip. Batts Audio, Video & Lighting

C. Quantity: As shown on drawings

2.23 MANUAL CLEW WINCH

A. The helically grooved cable drums shall be designed to properly support the required loads without crushing or deformation. Drums shall have integral hubs with properly sized shafts for the transmission of loads and torque, supported by self-aligning flange block bearings. All shafting shall be in accordance with the ANSI "Code for Design of Transmission Shafting" and as herein specified. All driving hubs must have a minimum of two set screws.

B. Drums shall be grooved at the pitch diameter in accordance with the recommendations of the wire rope manufacturer.

C. The hoist shall have two grooved drums and drive lines to provide redundancy.
D. There shall be a minimum of three dead wraps for each cable, and a clearance of at least two wraps to the end of the drum or to the start of the next cable winding. Drums shall carry only one layer of cable.

E. Cables shall terminate through a properly angled, smooth hole in the drum, sized to retain a Nicopress sleeve. Cable clips are not acceptable. Retainers shall be provided to keep the cable properly in its groove.

F. Hoist shall include a positive load holding brake capable of holding the load without movement or slippage at full capacity.

G. Provide secondary load holding and physical lock-out to prevent unauthorized use or movement of the hoist.

H. The hoist shall utilize a self-locking gearbox to prevent backwind.

I. Worm gear shall be enclosed in a sealed oil bath.


K. Hoist shall mount on a floor-mounted stand, per the Drawings.

L. Manual handle shall be removable.

M. Provide on drill motor for use with hoists. Maximum speed shall be 600 rpm.

N. Acceptable winch products:

1. J. R. Clancy Stagehand manual hoist
2. Thern Stage Equipment CW11 clew winch

2.24 Cable-guided clew

A. The guided clew shall be a steel plate with holes for 5 cables and dual drive lines. Two guide spools shall be provided for ¼” diameter guide cables.

B. Cable guides shall keep clew from unintentional twisting for its full path of travel.


2.25 CABLE SUNDAY

A. 3/16” galvanized utility wire rope crimped into a 30” endless loop.

B. Cable terminations made with copper swage fittings to reduce abrasions.

1. Provide eight (8). To be used with owner provided sandbags.

2.26 BASE BID AND ALTERNATE EQUIPMENT

A. All equipment indicated in the TR series drawings and within this specification shall be considered Base Bid equipment unless specifically called out as “Alternate Equipment”.
B. Provide a unit price for the addition or deletion of one (1) manual counterweight line set equal to a standard “Utility” line set. This unit price shall include all necessary equipment, components, and hardware for a complete, operational line set, as if it were provided as a base bid item and installed under this specification.

C. Provide a price for additional thirty (30) Strand Hui work light product. Include c-clamp, twist lock connector to match existing work lighting receptacles, safety cables, spare lamp, and spare color cassette with safety mesh.

PART 3 - EXECUTION

3.1 INSTALLATION, LABOR AND SUPERVISION

A. Employ only fully trained stage riggers, assisted by competent common laborers, for the erection and installation of the stage equipment and related accessories herein specified. Stage Riggers shall be adequately and properly trained in the erection and installation of the style of rigging specified herein. Employ a competent superintendent on the work at all times.

B. Install all items of the stage and auditorium rigging where indicated and completely connect and make operative as specified. Install in accordance with generally accepted theatre industry practices and the following references.

1. USITT Recommended Guidelines for Stage Rigging and Stage Machinery
3. Rigging Manual (published by the Construction Safety Association)

C. Install draperies at scheduled locations. After installation, all curtains and draperies shall be thoroughly brushed to remove all loose dust, visible dirt, fabric lint, loose threads, etc. Wrinkles will be permitted to fall out naturally. All curtains, or draperies, shall hang level and be uniformly in contact with the stage floor along the entire width of the curtain, or drapery.

D. Install cable clips where specified in accordance with manufacturer's installation instructions with correct amount of torque on nuts. After installation, apply a load to each batten and re-check for proper torque on nuts of cable clips. Battens shall be trimmed level to the horizon and parallel to the stage or auditorium floor to a tolerance of ±½” over the length of the batten.

E. Maintain wire rope fleet angles at one and one-half degrees (1½) or less. Install Mule Blocks as required to maintain specified angles. System should run quietly in every respect when operated.

F. Install electrical devices provided under this section for proper hoisting of equipment. Install cable saddles and rigging for plugstrips and hanging plug box SO cables. Cable saddles are furnished under other section and installed under this section.

G. Install counterweight arbors so they may be loaded at the loading gallery when batten is at scheduled low trim.

3.2 FLAMEPROOFING OF FABRICS
A. All fabrics used in the fabrication of the curtains and draperies herein specified, if not inherently flame-resistant by nature and fiber content of their own construction, shall be chemically flameproofed, by immersion process with pressure rolled extraction, in a formula approved by the Bureau of Standards of the United States Department of Commerce, and the finished fabrics, after treatment shall pass such tests as required by the Fire Marshal of the city of installation. A certificate for each type and color of cloth used in the fabrication of curtains and draperies for this project shall be furnished to the Architect before request for payment for such equipment is made. The certificate shall provide the following information:

1. The name of the Rigging Contractor.
2. The name and color of the fabric covered by the certificate.
3. The name of the firm doing the flameproofing (chemical treatment).
4. The date of the treatment.
5. The date of re-treatment will be required.
6. The name of the chemical formula used.
7. The method of application of the chemical used.
8. The signature of an officer of the company doing the flameproofing.
9. The signature of an officer of the company installing the equipment, herein known as the Rigging Contractor.
10. Both signatures shall be affixed to the certificate. A Notary Public appointed within the State where the flameproofing is done may witness the signature of the officer of the company doing the flameproofing. The signature of the Rigging Contractor may be notarized by a Notary Public appointed in the state of the installation or where the Rigging Contractor's office is located.

3.3 FABRICATION OF CURTAINS

A. All fabrics shall be sewn with box-pleats to specified fullness to jute upholstery webbing. Pleats shall be spaced 12” o.c. All thread used in sewing these curtains and draperies shall be cotton mercerized, and shall be the color of the fabric on which it is used, both in the needle and bobbin. The needle thread shall not be lighter than #16 in size, and the bobbin thread shall not be lighter than #24 in size. The same size thread shall not be used in both needle and bobbin. Double rows of stitching shall be used to sew the fabrics to the webbing. Bad stitching, missed stitches, puckered seams and hems, etc., will not be acceptable. All seams shall be sewn in straight and even lines.

B. All panels of fabric shall be of a single piece for the entire height of the curtain in which it is used. No splicing of fabric to achieve a desired length of cloth will be acceptable.

C. Linings shall be sewn into the top hem with same fullness as curtain. Vertical hems shall be 1-1/2" and shall fall 6" inside the curtain size. Tack to curtain with 3/4" webbing on 12" center. Bottom hem to be 3" and 6" shorter than curtain. Tack to curtain same as sides. Webbing tacks to allow enough slack to keep from distorting curtains in any way, and to allow for stretching of curtain fabric.

D. Unless otherwise noted, all pile fabrics shall have pile running up.

E. Bottom hems of all curtains shall be 6" and shall be weighed with a #6 galvanized pump chain. This chain shall first be encased within a heavy canvas pocket, with the pocket being sewn inside the hem at the top, thus keeping the chain from resting on the bottom of the hem.

F. Center of all curtains shall be marked clearly on the top webbing. If ties are provided with the curtain, they shall be black in color, except at center, unless otherwise noted.
G. Curtains, which are to be operated on traveler tracks, shall be equipped with black brass grommets set on 12" centers along the top webbing. The curtain or drapery shall be connected to the track carriers by means of a galvanized carrier-to-curtain fastener, as previously specified, at each grommet. Traveler panels shall be sewn with half-width fold-back on both leading and trailing edges.

H. Curtains, or draperies, which are to be 'dead-hung' on battens (legs and borders) shall be unpleated and shall be equipped with No. 2, or brass grommets and 30" long tie lines made from No. 4 cotton mason's line, the grommets to be set on 6" centers. Vertical hems of all "dead hung" curtains and draperies shall be 6".

I. The cyclorama curtain shall be one piece, flat with no pleats or seams. Side bottom and top hems shall be the same as a standard curtain. The 6" wide bottom hem shall have a special canvas flap sewn the continuous length behind it. Heavy duty snaps are to be provided on 2' centers along the entire length of this canvas flap. When the flap is snapped up and holding the 1" pipe weight that is to be furnished, the flap shall not be seen from the front and curtain shall be perfectly flat.

J. After installation in the building in their proper positions, all curtains shall be thoroughly brushed to remove all loose dust, visible dirt, fabric lint, loose threads, etc. Wrinkles will be permitted to fall out naturally.

K. Curtains shall have a permanent tag (no larger than 4" x 3") affixed to the top, upstage right corner of each finished panel. Each tag shall include the following information:

1. Name of Facility.
2. Name of company installing the equipment specified in this section.
3. Date installed.
4. Finished size (example 24'-0" H x 5'-0" W).
5. Use (see Rigging Schedule).
6. Fabric manufacturer, name, weight and color.

L. Main curtain

1. Fabric pile shall run down.
2. Front curtain height shall be determined by field measurement, to ensure that the top of curtain is not visible from any seat in auditorium. Finished height shall be this field measurement or dimension stated in curtain schedule, whichever is greater.

3.4 CLEARANCES

A. Entire rigging system and components shall, when completed, be free running and free from binding, rubbing, bumping, etc., in all respects.

B. Trim all curtains or draperies that are operated on traveler tracks at the drapery trim chain. Curtains shall be trimmed ¼" above the finished floor with a tolerance of +/-1/8".

3.5 INSTRUCTION OF OWNER PERSONNEL

A. A representative of the Contractor, fully knowledgeable and qualified in Rigging Systems operation, shall provide four (4) hours of instruction to the Owner designated personnel on the use and operation of this
System. Designated instruction times shall be arranged through the Owner and will occur over up to two sessions.

3.6 CLEANING OF THE SITE

A. Remove from the site all rubbish, trash, discarded packing materials, cartons, and other debris caused by daily operations. Upon completion of work, the entire area of work shall be left in broom and mop clean condition.

END OF SECTION 11 61 33