SECTION 11 61 00 - THEATER AND STAGE EQUIPMENT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Fabrication and installation of the complete theatrical systems, including:

1. Demolition of existing theater equipment.
2. Fire curtain and associated rigging.
3. Front curtain ensemble.
4. Cyclorama setting.
5. Tracks and battens.
6. Counterweight sets.
7. Skydrop, scenic drops, and scrims.
8. Projection screen and switch.
9. Pit Filler.
10. Acoustical panels over stage.
11. Acoustical panels over auditorium.
12. Stage and auditorium dimming system.
13. Emergency transfer system.
14. Stage and auditorium lighting controls.
15. Distribution devices and accessories.
16. Theatrical lighting fixtures, lamps, and accessories.
17. All necessary wiring and conduit from disconnect to fixtures and controls.

B. All material, equipment, and services shall be provided as specified herein and as indicated on the Contract Drawings.

C. Fabrication, delivery, and installation in accord with these specifications and pertinent drawings; and inspection and adjustment of the completed installation.

D. The Theatrical Equipment Contractor (TEC) for the work shall visit the site and check and verify all dimensions to coordinate the equipment with the structure and other trades. TEC shall furnish

any auxiliary steel and incidental items to result in an installation complete in all details whether or not such incidental items are specifically enumerated herein. It is the responsibility of the TEC to design the layout of the stage equipment so as to provide for a properly masked stage and one which best utilizes the specified equipment.

E. The TEC shall instruct representatives of the school in proper operation of all equipment furnished as part of his contract.

F. For the purpose of delineating work by various Contractors, the following is a substantive list of work and by whom it is to be performed.

1. The TEC (Theatrical Equipment Contractor for this project) and EC (Electrical Contractor for this project) shall closely coordinate their work.

2. TEC shall be responsible for the following:

a. Furnish all equipment specified in this section.

b. Install all stage equipment specified herein unless otherwise noted.

c. Install all curtains and tracks.

d. Physically install connector strips.

e. Install cable cradles.

f. Furnish, assemble, lamp, hang and rough focus all theatrical light fixtures.

g. Furnish SO cables, cable cradles, kellums, gridiron junction boxes.

h. Furnish and install all necessary hardware and rigging for the onstage electrics.

i. Install all battens including electric battens and tormentor pipes.

j. Provide field engineering, turn-on, and demonstration of dimming and lighting system.

k. Physically install projection screen.

l. Install dimmer rack, controller, dimming controls, control receptacles, wall pockets and associated equipment.

m. Electrical installation of all dimming and lighting system components specified in this section.

n. Make final connections and terminations of stage and house light circuits in rack.

o. Make final connections and terminations of stage light circuits at connector strips.

p. Make final connections and terminations of control wiring.

q. Install SO cable, kellums, and gridiron junction boxes.

r. Furnish and install stage circuits to dimmer rack.

s. Install Tormentor Pipes.

t. Furnish and physically install index lights.

3. EC shall be responsible for the following:

a. Provide electrical installation including terminations of projection screen and control.

b. Physically install projection screen control.

c. Furnish and install house light circuits to dimmer rack.

d. Furnish and install 600 amp three phase feed and disconnect switch within 3’0” of dimmer rack.

e. Electrically install index lights including switch and interconnecting wiring between units.

1.02 RELATED WORK NOT INCLUDED IN THIS SECTION

A. Structural Steel including loft and headblock beams. Locations shall be coordinated with TEC.

B. Structural Steel Beams – Locations of stiffening plates and stiffening beams at loft block beams and head block beams shall be arranged by structural steel contractor so as to avoid conflict with stage equipment.

C. Miscellaneous steel, bracing, supports, etc. shall be coordinated so as not to conflict with theatrical design.

D. Sprinkler system – Locations of pipes and system components shall be arranged to avoid conflict with stage equipment.

E. Rain Water Conductors shall be arranged to avoid conflict with stage equipment.

F. HVAC system – Locations of ducts and system components shall be arranged to avoid conflict with stage equipment.

G. Electrical system - Locations of conduits and system components shall be arranged to avoid conflict with stage equipment.

H. Carpentry – Locations and sizes of proscenium opening trim to be coordinated as not to interfere with the operation of fire curtain and/or installation of smoke pockets.

I. Electrical service.

J. Electrical disconnect located within 3’0” of Dimmer Rack.

K. Emergency power system.

L. Work Lights.

M. Firestopping.

N. Painting.

1.03 SUBMITTALS

A. Submit under provisions of general conditions.

B. Shop Drawings: Indicate end track and batten locations, width of platform opening, location of blocking for anchors, appurtenances and interferences, and support bracket details.

C. Product Data: Provide profiles, shapes, acceptable load data, finishes available, drapery fabric, and colors.

D. Manufacturer’s Installation Instructions: Indicate special anchor requirements.

1.04 QUALITY ASSURANCE

A. Equipment specified herein shall be that of a single manufacturer and installer having a minimum of twenty (20) years documented experience.

B. The Contractor must maintain and operate his own shop(s) and fabricate and assemble all components with the exception of standard hardware materials and equipment.

C. All work done under this contract shall conform to applicable local, state and national codes, and be performed within labor regulations.

D. Contractor shall be licensed and registered to perform work in Pennsylvania. Firms with out-of-state headquarters or corporations not incorporated in Pennsylvania must submit, prior to bid, a copy of their registration to do business in the commonwealth as provided by the Department of the State.

E. Contractor shall be an ETCP (Entertainment Technician Certification Program) Recognized Employer. Contractor shall employ ETCP Certified Riggers in management/lead/supervisory positions.

F. Manufacturer/Contractor shall employ a Quality Program through all of their manufacturing, installation, and management systems.

G. Where specific requirements for rigging components are more stringent and require precautions, procedures or refinements exceeding building codes or standards, such specific requirements shall supersede these codes and standards.

1.05 PRODUCT SAFETY AND GUARANTEE

A. The safety parameters set forth in this section of the specifications are intended to reflect safeguards and precautions related to normal use of the equipment under ideal operating and loading conditions, and to anticipate equipment misuse, human error, and misjudgment.

B. The work shall be fully guaranteed, with exception of normal wear, for a period as defined below after final acceptance and payment. Any items showing evidence of defective materials or workmanship including installation workmanship shall be corrected or replaced within thirty (30) days after notification, and without cost to the Owner.

1. Rigging equipment shall be warranted against defects in material and workmanship for a period of twenty (20) years.

2. Installation shall be warranted against defects in material and workmanship for a period of three (3) years.

3. Cable, termination hardware, and means of attachment shall be warranted against defects in material and workmanship for a period of two (2) years.

4. Curtain tracks shall be warranted against defects in material and workmanship for a period of two (2) years.
5. Curtains shall be warranted against defects in material and workmanship for a period of three (3) years.
6. Acoustical panels shall be warranted against defects in material and workmanship for a period of one (1) year.
7. Pit filler shall be warranted against defects in material and workmanship for a period of one (1) year.
8. Projection screen shall be warranted against defects in material and workmanship for a period of one (1) year.

1.06 SYSTEMS DEMONSTRATION

A. The Theatrical Equipment Contractor shall instruct representatives of the Owner in proper operation of all equipment furnished as part of this contract.

B. Instructor shall be an ETCP recognized trainer.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers shall provide products as specified. Specified part numbers are provided herein to provide potential bidders additional information and clarification. Bidders must meet or exceed specified standards.

B. Substitutions:
    1. Other manufacturers must submit, at least 10 days prior to bid, complete drawings, samples of load bearing components, and equipment data for this entire scope of work.
    2. Strength test data indicating Recommended Working Load of equipment from an Independent Testing Laboratory shall be submitted in order for the manufacturer to be considered for substitution.
    3. Letter of review and opinion of equipment equivalence shall be provided by a registered Professional Engineer licensed in Pennsylvania.
    4. Out-of –State contractors must submit prior to bid their Certificate of Registration through the Department of Labor and Industry, Corporation Bureau.
    5. Out-of-State contractors must submit prior to bid proof of Workers Compensation Insurance.
    6. Architect and/or Theatrical Equipment Consultant will review the submission and shall make final determination of acceptability of that manufacturer/contractor.
    7. Only approved equal bidders will be listed by addendum.

2.02 FABRICS

A. 25.5-ounce 100% polyester “Dante” velour as distributed by Pittsburgh Stage, Inc.

B. Lining where specified shall be 100% polyester “Janus” (black in color) as distributed by Pittsburgh Stage, Inc.

C. 14.5-ounce 100% polyester “Volcano” velour or “Karma” as distributed by Pittsburgh Stage, Inc. (black in color).

D. Heavy Weight Seamless Muslin (sky blue in color).

E. Heavy Weight Seamless natural Muslin.

F. Seamless Sharkstooth Scrim as distributed by Pittsburgh Stage, Inc.

G. Seamless Leno Filled Scrim as distributed by Pittsburgh Stage, Inc.

H. All fabrics of their various kinds and colors shall each be from one and the same dye lot. When materials of one color exceed limit of one dye lot, the balance must be identically matched with the original lot. No “run of the mill” usage of colors will be acceptable.

I. All combustible fabrics shall be either inherently flame resistant or chemically flameproofed by immersion for compliance with all applicable codes. Spray method of flameproofing is unacceptable. This contractor shall furnish flameproofing certificates, giving name of flameproofing chemical used, identification of flameproofer, method of flameproofing used, and date.

2.03 STAGE DRAPERY FABRICATION

A. Front curtain ensemble shall contain no less than 50 percent sewn-in fullness.

B. Cyclorama setting shall contain no less than 50 percent sewn-in fullness.

C. No smaller than half widths shall be used in construction of curtains.

D. Knife pleats shall be at 12" centers with heavy 3" polypropylene webbing at heading. Headings shall be finished with grommets and "S" hooks; grommets and tie lines; or plain as required. Grommet shall pass through three full layers of face fabric. All vertical seams shall be hidden within the fold of the pleats. "Round pleats" formed by hanging two grommets from one "S" hook is not acceptable. Knife pleats shall be directional and "point" off-stage.

E. Salvages shall be scissor-clipped on 24" centers to relieve puckering at vertical seams.

F. Grommets shall be black. No smaller than #3 toothed grommet shall be used. Plain washer grommets are not acceptable.
G. Lining shall contain same fullness as face fabric.
H. Lining shall have 2" side hems and 4" bottom hems.
I. Lining shall be attached to side hems of face fabric with adjustable tabs on 18" centers.
J. Lining shall be attached to bottom hems of face fabric with adjustable tabs on 36" centers.
K. Tie lines shall be black 5/8" polyester braid.
L. All Traveler curtains shall have one-half width turn-back at on and off stage edges in addition to specified fullness.
M. On-stage leading edge of all traveler curtains and front curtain shall contain 12" x 3" heavy polypropylene webbing reinforcement from the heading to 12" beneath the heading, concealed within the side hem/turn-back of the curtain.
N. Front curtain shall have 6" bottom hems. Valance and/or teaser shall have 4" bottom and side hems.
O. Cyclorama curtains shall have 4" bottom hems with a #8 jack chain encased in a separate pocket suspended 2" from the bottom of the curtain. The use of galvanized lead weights is not acceptable.
P. All other hems are to be 2".
Q. There shall be no horizontal seams unless indicated.
R. A separate 3" x 54" flameproof strip shall be sewn to the off-stage bottom hem of each type of curtain for the purpose of removing samples for testing.
S. Thread shall be glazed, left twist, #24.
T. As manufactured by Pittsburgh Stage, Inc.

2.04 FINISHED DIMENSIONS

Dimensions are in feet. Dimensions are approximate and it shall be the responsibility of this contractor to properly mask the stage for optimum functionality. See section 2.02 FABRICS for Material requirements.

ITEM	QUANTITY	WIDTH	HEIGHT	MATERIAL
Valance	1			A
Front Curtain	2			A

Teaser	1			A
Tormentors	2			A
Side Legs	6			C
Ceiling Borders	4			C
Speaker Curtain	2			C
Olio Curtain	2			C
Mid-stage Curtain	2			C
Rear Curtain	2			C
Scrim	1			F
Scrim	1	40.00	20.00	G
Drop	1			E
Drop	1			E
Sky Drop	1			D

2.05 CURTAIN TRACKS AND BATTENS

A. An 8:1 safety factor shall be used in the suspension of all overhead rigging. All attachments shall be submitted for approval of the Owner/Architect/Engineer.

B. Traveler Tracks: Silent Steel Model #282 CWANA with nylon wheeled ball bearing carriers, as manufactured by Automatic Devices Company. RWL to be not less than 50 pounds per linear foot. Lengths to suit traveler curtains. Curtain tracks (Model 2800) shall be of 14 gauge galvanized steel construction, entirely enclosed except for slot in bottom, each half to be in one continuous piece except where splicing clamps are required. Each curtain carrier (Model 2851) shall be spaced 12” centers and shall be of steel construction with two nylon-tired ball bearing wheels held to steel body by rustproof nickel plated rivet, such wheels rolling on two separate parallel treads. Each curtain carrier shall consist of a free-moving plated swivel and sufficient trim chain to accommodate curtain snap hook. Live-end pulley (Model 2863) and Dead-end pulley (Model 2864) blocks shall be adjustable and shall be equipped with 5” diameter sleeve-bearing wheels adequately guarded. A rubber bumper shall be attached to each curtain carrier to function as noise reducer. The manufacturer shall furnish two end stops for placement at each tract end and a tension floor pulley (Model 2866) for increasing cord tension. Stretch-resistant operating cord (Model 2828 for hand operation and Model 2829 for machine operation) shall have synthetic or wire center and shall be of 3/8” , or 3/16” diameter. Ten 30’0” sections required. Aluminum tracks are not acceptable. Tracks and components shall be from single manufacturer; using components from multiple manufacturers is expressly not permitted.

C. Side Leg Track: #2800 channel complete with two #28 Rotodrapers and end stops as manufactured by Automatic Devices Company. Four 60’-0” sections required. Aluminum tracks are not acceptable. Tracks and components shall be from single manufacturer; using components from multiple manufacturers is expressly not permitted.

D. Battens: 1 ½” Scheduled 40 black pipe with 18” long 1-9/16” OD x .250” wall structural tubing internal splices bolted in place. Battens shall be furnished for all items except dead hung tracks not requiring a pipe spine. Aluminum battens are not acceptable.

E. Tormentor pipes: 1 ½" Scheduled 40 black pipe shaped and formed including welded ¼" thick wall flanges. It shall have ten centrally pivoting arms permanently attached to the main structure that shall lock in position after fixtures are hung. Tormentor pipes to be chemically finished flat black. Length and quantity as required to properly support fixtures.

F. Acoustical Curtain Tracks: #500 track as manufactured by Automatic Devices Company. Lengths to suit traveler curtains plus adequate length to store curtain in pocket as required. Provide four #2905 curtain machines mounted at the catwalks with necessary muling sheaves to accomplish serviceable location. Wiring and electrical connection by others. Tracks and components shall be from single manufacturer; using components from multiple manufacturers is expressly not permitted.

2.06 COUNTERWEIGHT RIGGING

A. Minimum system and component loads:

1. Minimum system WLL: 3,200 pounds
2. Minimum head block WLL: 3.200 pounds
3. Minimum loft block WLL: 1,200 pounds
4. Minimum counterweight carriage WLL: 1,200 pounds
5. Minimum floor block WLL: 500 pounds
6. Minimum rope lock WLL: 500 pounds
7. Minimum locking rail single point upload limit: 500 pounds
8. Working Load Limit (WLL): The Working Load Limit (rated capacity) is the maximum load that shall be applied to equipment properly installed, in like-new condition, and applied using industry standard techniques. The WLL is the maximum load that shall be applied in direct tension to an undamaged straight length of chain.

B. Each counterweight system shall consist of the following:

ITEM	QUANTITY
12" Head Block	1
Loft Blocks	**8**
12" Floor Block	1
Rope Lock with keyed lock	1
6' Counterweight Carriage	1
1/4" 7x19 Galvanized Aircraft Cable	**750**'
3/4" Multiline II Rope	**90**'
Extruded Aluminum A-Bar Channel	**90**'
Counterweights	**700**lbs.
1 1/2" schedule 40 Batten	**60**'

Cable sag pick-up devices **3**

40 Counterweight sets required.

Stage electric sets shall incorporate the above plus one loft block to accommodate associated SO cable. Carriages for the onstage electrics shall be sized to accommodate weight of electrics.

C. Sheaves:

1. Sheave material: AISI # C1045 carbon steel
2. Allowable Radial Pressure: 900 PSI
3. Minimum Tensile Strength: 82,000 lbs/square inch
4. Minimum Yield: 45,000 lbs/square inch
5. Hardness: 229 – 248 BHN
6. Minimum head block pitch diameter: 12”
7. Minimum floor block pitch diameter: 12”
8. Machine bored and faced
9. Lathe turned grooves
10. Grooves shall support rope through a minimum 135 degrees
11. Grooves shall have 5 degree chamfer to reduce wear of rope
12. Allowable fleet angles: up to 5 degrees
13. Injection-molded plastics are expressly not allowed

D. Head Blocks: Head Blocks shall have a minimum of 3200-pound Recommended Working Load (RWL). Sheaves shall be all steel construction as above. 1” cold rolled steel shafts equipped with flanged Timken tapered roller bearings (Cone # 07100 and Cup #07204B), jam nuts, 10 gage steel side plates and 2” x 1 ½” x ¼” base angles. Machined sheave only weight shall not be less than 34lbs. Base angles shall be bolted and welded to side plates. Bolts shall not be less than 3/8” grade 5. Pittsburgh Stage, Inc. #HB12-8.

E. Mule Blocks: Sheaves shall be all steel construction as above. 1” cold rolled steel shafts equipped with flanged Timken tapered roller bearings (Cone # 07100 and Cup #07204B), jam nuts, 10 gage steel side plates and 2” x 1 ½” x ¼” base angles. Machined sheave only weight shall not be less than 34 lbs. Mule blocks shall be used where fleet angles exceed five degrees. 8” mule blocks shall have a machined sheave only weight of not less than 19 lbs. Base angles

shall be bolted and welded to side plates. Bolts shall not be less than 3/8" grade 5. Pittsburgh Stage, Inc. #MB8-8.

F. Loft Blocks:
   1. Loft Blocks shall have a minimum 1200-pound RWL. Pittsburgh Stage, Inc. #LB8-1/4.
   2. Sheaves shall be all steel construction as above.
   3. 5/8" grade 5 steel shafts equipped with precision ground sealed ball bearings, jam nuts, 10 gage steel side plates.
   4. Hook and clip assembly shall incorporate not less than ¾" threaded fastener able to withstand up to 250 foot-pounds of torque applied to the fastening nut without reducing the blocks RWL.
   5. Machined sheave only weight shall not be less than 12 lbs.
   6. Blocks shall contain a minimum of five (5) cross spacers and (5) 5/16" grade-5 cross spacer bolts.
   7. Loft Blocks shall be equipped with 3" diameter nominal idler blocks to support all adjacent rigging cables within each set and prevent catenary cable sag.
   8. First (short short) Loft Block shall be an 8" multi-groove loft block constructed as mule blocks above. Side plates, hooks and clips as required for 1200-pound WLL. Pittsburgh Stage, Inc. #LB8-8-1/4.

G. Floor Blocks: Floor Blocks shall have a minimum of 500-pound RWL. Sheaves shall be 12" diameter. Sheaves shall be all steel construction as above. 5/8" grade 5 steel shafts equipped with precision ground sealed ball bearings, jam nuts, 10 gage steel side plates, base angles as required. Machined sheave only weight shall not be less than 14 lbs. Floating Floor Block weight to be not less than 30 lbs. Pittsburgh Stage, Inc. #FB12-3/4-FL.

H. Blocks shall contain appropriate number of bolted cross spacers to positively prevent cables from escaping grooves.

I. Counterweight Carriages:
   1. 3x7.1 ship channel top and bottom.
   2. Two steel angles shall be welded to inside of bottom channel such that weights rest properly on angles and not on nuts.
   3. Connecting rods shall be ¾" cold-rolled round steel with clean-cut threads and fitted with three nuts per rod end (two outside carriage and one inside carriage).
   4. Carriage shall have safety plate, spreader plates at 24" intervals, and locking collars.
   5. Guide pads shall be fabricated of ¼" thick ultra high molecular weight polyethylene.
   6. Carriages shall be clearly marked at 24" vertical intervals with "Place Spreader Plates Here."
   7. Carriages for the onstage electrics shall be sized to accommodate weight of electrics.

8. Pittsburgh Stage, Inc. #CC-T.

J. Rope Locks:
   1. Rope Locks shall have a minimum 500-pound working Load Limit. All steel construction.
   2. Dogs, handles, and housings shall be of 1045C steel. No cast parts acceptable.
   3. Rope lock handles shall have an overall length of 8 ½", top of handle to eccentric apex of 7 ½" and 1 ¼" width at cam. Cam width shall equal dog width. Dogs shall be 3 ½" in length and 1 ¼" width. Widths of handle cam and dogs shall fit in housing such that tolerances eliminate dog chatter. The use of washers is explicitly prohibited.
   4. These dimensions are critical to the proper compression of the rope and shall not vary.
   5. Handle shall lock in just-past-vertical position such that compression of rope eases at last 2-3 degrees of handle movement past plumb.
   6. The rope lock shall also incorporate a tamperproof lock to positively prevent unauthorized use, and shall be of a design to prohibit lockout during a performance. Hold-open mechanism shall be incorporated into rope lock. For this reason plunger type locks are not acceptable.
   7. Cast iron handles and dogs are not acceptable.
   8. Dog adjustment set screw shall be Nylon-tipped.
   9. Vinyl coated oblong rope lock ring to be provided.
   10. Rubber bumper shall be incorporated in to housing to dampen handle noise when unlocked.
   11. Pittsburgh Stage, Inc. #RL.

K. Terminations:

   1. Cable ends shall be terminated with a thimble and zinc plated copper nicropress fitting.

   2. Battens shall be suspended by 7mm x 40" long grade 63 trim chains.

   3. Chain shall meet requirements of OSHA CFR 1910.184 Slings.

   4. Grade 30 chain is expressly not allowed for it is not intended for overhead sling use.

   5. 5/16" drop forged galvanized screw-pin anchor shackle shall be used at chain terminations.

   6. Anchor shackles shall be properly moused to prevent unscrewing.

   7. Other methods shall be as approved by theatrical consultant.

L. Chain: Chain shall be hot dipped galvanized 7mm grade 63 welded link theatrical chain. Chain shall meet requirements of OSHA CFR 1910.184 Slings.

M. Shackles: Shackles shall be drop forged galvanized screw-pin anchor shackles. Shackles shall have a WLL of no less than 1,000 pounds. Shackle pins shall be moused with seizing wire or other approved device to positively prevent unscrewing.

N. Beam Clamps: Beam clamps shall be used at all dead hung supports connecting to structural steel beams. Beam clamps shall encompass both sides of the beam flange and shall have a minimum RWL of 750 lbs. PSI model #BC-01 or Coffing BC series.

O. Cable Clamps: Clamps shall be drop forged. Two clamps shall be applied to terminations of ¼" wire rope according to wire rope manufacturers' recommendations.

P. Thimbles: Heavy-duty thimbles shall be used in the termination of all wire rope. Thimbles shall be installed to manufacturers' recommendations.

Q. Counterweight Carriage Guide System:

1. The "A" bar guide for the counterweight equipment shall be of tempered extruded aluminum consisting of ¼" thick T's to guide each counterweight carriage. Steel "T"s with steel spacers is not acceptable. Guide tracks shall be of one continuous length up to 30'0"; splicing shall be free of any burrs and shall be flush.
2. "A" bar shall be extruded such that it includes a channel on the backside of the "T"s for the purpose of keeping the "T" rigid from wall batten to wall batten. The use of clips attaching to one side of a guide system is expressly prohibited.
3. "A" bar Minimum weight/foot: 1.63 lbs.
4. Guide tracks shall be installed vertically and plumb within the same plane, extending from locking rail to head block beam to permit maximum travel of carriage.
5. Provide wall knees, battens and appropriate anchors in necessary numbers to assure proper support, maximum distance from wall batten to wall batten shall not exceed 5'0".
6. Pittsburgh Stage, Inc. #CCG-AA.

R. Locking Rail: Box arrangement comprised of steel channel and bar stock with integral bumper rail. Locking rail stands shall not exceed 7'0" on center. Identification cards shall be permanently installed at each rope lock. Cards shall be of dry-erase material so that markings can be easily changed. Pittsburgh Stage, Inc. #LR-IBR.

S. Bumper rails: Top and bottom bumper rails required. Supporting angle shall be ¼"x2 ½"x2 ½" steel. Steel angle shall support wood rail and be bolted at no less than 24" centers. Wood shall be 2 3/8" x 2 3/8" laminated hard maple or red oak.

T. Hauling Lines: Three-strand polyester grab line; ¾" in diameter; polypropylene core; Multiline II. Minimum breaking strength: 11,000 Lbs.

U. Load Cables: ¼" preformed 7 x 19 galvanized aircraft cable. Breaking strength: 7,000 Lbs.

V. Index light: Provide index light the length of locking rail. Provide appropriate suspension devices. Wiring by others.

W. Signs and Certifications: Provide signage at operating areas that indicate recommended working load limits of rigging equipment and structural steel. Four 8 ½" x 11" signs required. Language of sign shall be as approved by architect and structural engineer. Component capacities, system capacities, and loading capacities shall be included on sign information. Safety instructions shall

be included on sign information. Provide Steel enclosure with tempered glass locking door to house certificate of rigging inspection.

X. Counterweights: All edges of weights shall be ground chamfered and smooth. Counterweights shall be free of burns and rough edges. Tumbled weights are not acceptable. All weights shall be shop painted black with oil based chemical coating. 20,000 pounds required. Weights shall have two opposite corners removed for staggered stacking and easy removal. Weights shall be 1" thick by 6" wide x 13 ¾" long.

2.07 FIRE CURTAIN

A. Fabric:

1. CSC-G2WC as manufactured by Thermotex.

2. Style: #CSC-2GWC non-corrosive wire-inserted 100% glass yarn fabric; Beige or White high temperature priority coating.

3. Weight: 40 ounces per square yard (nominal); 38 ounces per square yard minimum.

4. Thickness: 0.006" diameter phosphor bronze or nickel.

5. Count: 11 x 11 warp x fill (approx. minimum).

6. Tensile Strength: 400 pounds per inch minimum (warp).

7. Ravel Strip Method: 40 pounds inch minimum (fill).

8. Wire-Insertions: 0.006" diameter phosphor bronze or nickel.

B. Service Temperature: When subjected to large and small gas fired oven tests using the standard time-temperature curve (1,000 degrees Fahrenheit at five minutes/1,300 degrees Fahrenheit at ten minutes/1,550 degrees Fahrenheit at 30 minutes/1,700 degrees Fahrenheit at one hour), for 30 minutes, and using near constant temperature at or above 1,700 degrees Fahrenheit for 30-minute period; curtains and fabrics have prevented the passage of flame and smoke through the curtain, always without the presence of glow.

C. Chemical Resistance: Resists, most acids and alkalis (except hydrofluoric and hot phosphoric acids). Unaffected by bleaches and solvents. Will not mildew or rot.

D. Type: Curtain shall be Brail type. Curtain shall be of necessary size to overlap proscenium walls 1'-6" on each side and proscenium arch 6'-0" . Curtain shall have 4" side hems, 6" top and bottom pockets, and a 3" bottom yield pad. Curtain shall be as fabricated Thermotex, or approved equal.

E. Rigging: Fire curtain rigging shall consist of the following and be complete in every detail. Provide a functioning system to meet applicable codes.

1. 12" head block #HB12-8; one (1).

2. 12” loft blocks #LB8-1/4 with 1” shafts; 6 required.
3. 1200 lbs. capacity Brail Winch.
4. 2” standard black pipe; two (2).
5. 160-degree fusible links; six (6).
6. #8 cotton braided wire center fire line.
7. Two fire curtain pull-release stations.
8. 4” fire line pulleys #411/8; two (2).
9. 1/4” GAC; one lot.
10. Eight-line clew; one (1).

F. Construction Details: Refer to Paragraph 2.06

G. Smoke Pocket:

1. Smoke pocket shall consist of ¼” x 6” x 18” steel “Z” plate.
2. Smoke pocket shall extend 2’-0” above proscenium opening.

2.08 ACOUSTICAL PANELS

A. Panels shall be as manufactured by Pittsburgh Stage, Inc.

B. Construction shall be hollow core with structural lumber styles and rails.

C. The core shall be completely filled with honeycomb structure.

D. All visible surfaces shall be pre-finished ¼” birch plywood.

E. Stain / finish shall be as selected by architect.

F. Hardware connections shall be via no less than six 5/16” grade five machine screws and pre-installed threaded inserts fastened to interior wood frame.

G. Suspension shall be 1/4” x 1 1/4” steel.

H. Pivot shafts shall be 5/8” grade five steel.

I. Panels shall rotate to and be held in any position within 90 degrees of horizontal.

J. Four rows of acoustical reflector panels shall be installed on four stage battens described above. Panels shall be 3’0” wide x 6’8” high. Panels shall be as manufactured by Pittsburgh Stage, Inc. as above. Panels shall be easily pivoted requiring no more than one person to the desired angles to facilitate both flying of the panels and tuning of the acoustics. 48 panels required.

2.09 PROJECTION SCREEN

A. Da-Lite screen Co. - Senior Electrol Screen – 20’0” high x 20’0” wide electrically operated 115 AC (60 Hz) 3.5 amp. Three wire quick reversal motor to be especially designed for the purpose, to be ball bearing and oiled for life, with automatic thermal overload cutout and integral interlocking gears. To have preset but accessible limit switches to automatically stop screen fabric in the “up” and “down” position. Stop action to be positive to prevent coasting. Rigid metal roller at least 5 ¾” diameter. Roller to be mounted on two cast aluminum brackets equipped with self-aligning bearings. Screen surface to be flame retardant and mildew resistant, glass beaded (with black masking borders). Case to be of wood, with double top for extra rigidity and sound deadening. Motor compartment to be metal lined. Case to be finished with primer coat, ready to accept final finish by others. Heavy metal brackets shall be supplied for mounting screen to ceiling. The complete screen unit shall be “Listed by Underwriters Laboratories, Inc” and shall bear the reexamination markers of the Underwriters Laboratories, Inc. Screen shall be complete with 3-position control switch.

PART 3 - LIGHTING

3.01 MX DIMMER BANK

A. General: The installation rack shall be the MX as manufactured by Electronics Diversified, Inc. The fully digital dimmer rack shall contain up to 48 dimmer module spaces. MX rack systems shall be UL and cUL listed and shall be so labeled when delivered to job site.

B. Physical: The MX dimmer rack shall be a freestanding, dead front switchboard, substantially framed and enclosed with code gauge steel panels. All rack components shall be properly treated, primed and finished. Exterior surfaces shall be finely textured with scratch resistant, two-part polyurethane or equal. Removable top, side, and bottom panels shall facilitate conduit termination. Racks shall be available in three sizes, with the following configurations:

MODEL #	RACK DIMENSIONS (HxWxD)	MAXIMUM MODULE COUNT	
		With Main Breaker	Main Lugs Only
MX-12	36” x 21” x 21”		12
MX-24	48” x 21” x 21”	12	24
MX-48	84” x 21” x 21”	36	48

C. Racks shall be designed for front access to allow back-to-back or side-by-side installation.

D. Racks shall be designed to allow easy insertion and removal of all modules without the use of tools. Internal supports shall be provided for precise alignment of dimmer modules into power and signal connector blocks. With modules removed, racks shall provide clear front access to all load, neutral, and control terminations. Racks that require removable panels to access load, neutral or control terminations shall not be acceptable.

E. An optional buss kit shall be available from the factory to allow adjacent racks to be powered by a single line feed.

F. The rack shall be configurable to accept mixed dimmer types and sizes throughout the rack.

G. Each rack shall provide a lockable full-height door containing an electrostatic air filter that shall be removable for easy cleaning.

H. Forced-air cooling of the rack shall be provided via a low noise fan. The fan shall draw all intake air through an integral electrostatic air filter, over the surfaces of the module housing an out of the rack. The fan shall maintain all components at proper operating temperature when dimmers are under full load, provided the ambient temperature of the dimmer room does not exceed 40 degrees C (non condensing). The fan shall turn on whenever and dimmer in the system is activated. In the event of an over-temperature condition, only the affected dimmer module(s) shall shut down and an LED indicator shall appear on the affected dimmer module(s) and control module. The fans shall remain on during thermal shutdown of individual dimmer modules.

I. Each rack shall be supplied with a convenience panel containing a 20 Amp, 120 volt, 60 Hz, AC (220/240 Volt, 50 Hz) grounded duplex power outlet.

J. The dimmer rack shall be equipped with an illuminated LCD status beacon. The LCD status beacon shall display current status of the rack and display the following messages:

1. DMX port A or B status.
2. Phase A, B or C is below safe operating voltage.
3. Phase A, B or C is above safe operating voltage.
4. Rack has shut down due to improper startup voltage.
5. Over temperature protection has caused a dimmer module to shutdown.
6. Ambient temperature is below safe operating temperature.
7. Ambient temperature is above safe operating temperature.
8. Rack's "Service Mode" is activated.
9. Backup look is active/stored.

K. In addition, racks equipped with the optional Dimmer Information System shall display dimmer module location with the following messages:

1. Load condition.
2. DC detected on dimmer output.
3. SCR failure.
4. Circuit breaker has tripped.
5. Removal of Dimmer.

6. “No Load” detected.

L. The dimmer rack shall have the capacity to house an optional system main breaker. The main breaker shall serve as a disconnect for the system. The system shall have an AIC rating limited by the main breaker. (Specify if required.)

M. Each MX dimmer rack shall include a single duplex receptacle (Service Outlet) and 20-amp breaker for testing and service equipment. Dimmer racks that do not include a service outlet for testing and service must provide at a minimum of 20 amp duplex receptacle in the same location as the dimmer rack.

N. Electrical: The rack shall operate on 120/208V, three phase, four wire + ground, 50/60 Hz or 120/240V Single Phase 50/60 Hz. Other voltage and phase options are available upon request.

O. The rack will have a vertical phase buss rated for 100% continuous duty and a system fault current rating of up to 100,000 AIC.

P. The dimmer modules will be sequentially numbered, labeled and addressed from top to bottom.

Q. No two consecutive dimmer modules shall be on the same phase. Dimmer racks, which require electronic addressing to meet this requirement, are not acceptable.

R. All control wiring shall conform to the recommended practices for DMX512 and Ethernet specifications as published by USITT and ESTA.

S. Electronics:

1. Dimmer control electronics shall be contained in one plug-in control module. A hand-held remote control keypad with LCD display shall be provided for system configuration, testing and diagnostics. The LCD shall also display rack status and messages. The control module shall include, but not be limited to, the following user indicators:

    a. DMX port A or B status.

    b. Phase A, B or C is below safe operating voltage.

    c. Phase A, B or C is above safe operating voltage.

    d. Rack has shut down due to improper startup voltage.

    e. Over temperature protection has caused a dimmer to shut down.

    f. Ambient temperature is below safe operating temperature.

    g. Ambient temperature is above safe operating temperature.

    h. Rack’s “Service Mode” is activated.

2. Remote control shall include, but not be limited to, the following displays:

a. Dimmer display shall allow a dimmer or dimmers to be set at a level. (Control module shall allow user to set single dimmers or groups of dimmers from remote keypad.)

b. Backup display to program and activate system-wide backup looks.

c. Display information shall allow monitoring of system, rack or dimmer status.

d. System information shall provide information about DMX outputs, panic circuits, backup looks and system name.

e. Rack information shall provide information about rack voltage, starting addresses, ambient temperature and rack type.

f. Dimmer information shall provide information about dimmer size, type, location, output levels and control source.

U. Setup display shall allow, but not be limited to, configuring of rack addresses, dimmer firing mode and line compensation values.

V. The control module shall respond to control changes in less than 25 milliseconds. Dimmer outputs shall exhibit no oscillating or hunting for levels.

V. Dimmer output shall be regulated for incoming line voltages. The control module shall monitor and adjust each dimmer's output to maintain a constant power to the load. Regulation shall maintain the desired output voltage for the entire operating range (90-140V AC) with the exception that the maximum output will be no greater than the line voltage minus dimmer insertion loss. There shall be no interaction between dimmers or any other equipment in the system. Line compensation shall be field adjustable on a dimmer-by-dimmer basis to allow for varying cable length.

W. A minimum of two (2) optically isolated DMX512 inputs shall be provided, allowing overlapping or separation of any control level. Twenty-five hundred volts (2,500V) of optical isolation shall be provided between the DMX512 inputs and the control module. Optical isolation shall protect the DMX512 inputs from a failed control module and shall protect the control module from failed DMX512 inputs. Systems that do not have optical isolation shall not be acceptable.

X. The control module shall include DMX512 input connector for testing purposes. Dimmer racks that do not include a DMX512 input connector in the control module must provide at a minimum a DMX512 input in the same location as the dimmer rack for testing/servicing.

Y. There shall be the provision for a minimum of twelve (12) 0-10V analog inputs to allow for analog control of the rack. Each dimmer may be assigned to any one of the twelve analog inputs. When so supplied, the analog input option shall not reduce the number of incoming DMX512 signals.

With the exception of the optional analog inputs, the control module shall be completely digital without employing any digital-to-analog de-multiplexing schemes or analog ramping circuits. Each rack shall, in the event of signal loss, maintain the last level for a user-programmable time. Systems that do not offer this feature shall not be acceptable.

The control module shall contain diagnostic routines to allow the user to test and troubleshoot the system.

Z. A system-wide panic circuit shall be provided. Any dimmer or group of dimmers in any rack may be assigned proportionally to the panic circuit. Each dimmer may be individually assigned a specific address for each DMX512 input.

AA. The control module shall be able to record backup looks. Backup looks may be programmed by any of the following methods: recording current dimmer levels (as set by the console or other remote programming device); entering dimmer levels on the control module directly; entering dimmer levels as a remote station. Multiple backup looks may be active simultaneously with inputs operating on a highest take precedence basis.

Two separate and distinct patches shall be available. Selection between the patches shall be possible by a remote control.

All control module system functions may be activated by a hand-held remote control keypad. Systems that do not offer this feature shall not be acceptable.

BB. The control module shall include a single function service switch that shall allow the end user to bypass the control electronics configuration. When activated, the service switch shall drive all circuits to full output. Control modules that do not include a service switch are not acceptable.

CC. The control module shall accommodate optional remote control devices via the Multi-Link Network.

DD. Multi-Link Network: The Multi-Link Network (MLN) shall provide remote monitoring, programming and backup functions for the system through any compatible console, PC or hand – held remote device.

EE. System information shall also be displayed on any system interface including the control module and the devices listed above.

FF. The Multi-Link Network shall provide an integral link to connect all racks in the system for rack-to-rack communication. Information for all configuration and backup looks shall be stored in a control module to allow swapping of control modules throughout the system. Systems' not storing all configuration data and backup looks for each dimmer in all control modules shall not be acceptable.

GG. The Multi-Link Network off-line editing software shall allow user programming and remote storage of the system parameters. These parameters shall include, but not limited to, defining rack type, module type, output voltage (Line Compensation) for each dimmer, firing mode, curve, dimmer numbering and DMX 512 port assignments. Systems that do not offer these user programmable features will not be acceptable.

HH. Dimmer Information System

1. The Dimmer Information System (DIS) option shall allow monitoring of current and output voltage on a dimmer-by-dimmer basis and shall provide information on dimmer status and input voltages via the DIS Display.

2. Dimmer specific information, such as dimmer failure or SCR failure shall be displayed as an error on the control module and the DIS Display. DIS Display messages shall include, but not be limited to, the following:

    i. Load condition

    ii. DC detected on dimmer output

    iii. SCR failure

    iv. Circuit breaker has tripped

    v. Removal of Dimmer

    vi. "No Load" detected

    vii. The control module shall allow the user to record the loads of all DIS dimmers in the system.

3.03 MXSCR INCANDESENT Dimmer Modules

A. General: The dimmer modules shall be the MX as manufactured by Electronics Diversified, Inc. Furnish and install dimmer modules in types and quantities as shown on the drawings and specified herein.

B. Physical: Dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall consist of a heavy-duty chassis with integral top, bottom, side and face panels.

C. No tools shall be required for module removal and insertion.

D. The removal of any single module shall not expose line or low voltage terminations less than six (6) inches from the front of the rack.

E. Each module shall be labeled with the manufacturer's name, catalog number and rating.

F. Modules constructed of molded plastic for structural support are not equivalent and are not acceptable.

G. Dimmer modules shall be UL and cUL Recognized.

H. Dimmer modules shall be available as dual 2.4kw, dual 1.2kw or single 6kw.

I. Electrical: Each dimmer shall provide, but not be limited to, the following:

1. The dimmer module shall contain a circuit breaker for each circuit, a solid-state switching module, associated toroidal filters, status indicators and power and control connectors.

2. The dimmer module shall not have any protruding pins subject to physical damage when the module is not installed.

3. Circuit breakers shall be fully magnetic and UL listed. The trip current shall not be affected by ambient temperature.

J. SCR Assembly: Each dimmer module shall use a solid module (SSM) consisting of two silicon-controlled rectifiers (SCRs) in an inverse parallel configuration and all required gating circuitry on the high voltage side of an integral, opto-coupled control voltage isolator. The (SSM) shall be thermally protected, independent of the control module.

K. Filtering: Each dimmer shall have a toroidal, copper-wound, iron-core, high performance choke. The rise time ratings for a 2k dimmer shall be as noted in the manufacturer's oscilloscope data, but in no case shall be less than the following:

350 Microseconds (Standard)

Watts	Rise Time
1000 (8.33A)	300 Microseconds
1500 (12.5A)	325 Microseconds
2400 (20A)	350 Microseconds

500 Microseconds (High Performance)

Watts	Rise Time
1000	400 microseconds
1500	450 microseconds
2400	500 microseconds

All Rise Time measurements are between 10%-90% with dimmer output at 50%. Alternate manufacturers must supply either high performance chokes or certified test data ensuring compliance with the above.

L. Performance: At the maximum rated load with 120 volts input the dimmer shall have an insertion loss of no more than 3.8 volts rms. The maximum heat loss for each 2.4 kW dimmer shall be no greater 108 BTU's per hour per connected kilowatt of load.

3.04 MX UNIVERSAL FLUORESCENT DIMMER MODULE

A. General: The dimmer modules shall be the MX UFD as manufactured by Electronics Diversified, Inc. Furnish and install dimmer modules in types and quantities as shown on the drawings and specified herein.

B. Physical: Dimmer Module chassis shall be constructed of heavy-gauge (.063) sheet aluminum formed so to integrate all sections without exposing any electrical components to the exterior.

C. Dimmer modules shall be fully plug-in and factory wired.

D. No tools shall be required for module removal and insertion.

E. Module dimensions shall be: 16.25” w X 1.126” h X 6.880” d. Construction shall be such that no line nor low voltage connections are within five (5) inches of the front of the module. Input and output connections shall be flush mounted.

F. Modules of plastic construction or exposed live electrical components upon removal are not equivalent and are not acceptable.

G. The modules shall be entirely painted on the exterior with non-lead gray polyurethane enamel. Nomenclature shall be black, permanent paint, applied via silk screen.

H. Electrical: Each dimmer shall provide, but not be limited to, the following:

1. The front panel shall indicate manufacturer, model, and the number and capacity of the module dimmer(s).

2. This panel shall allow monitoring of dimmer status via lighted display.

3. This display shall include a separate indicator of Fault status.

I. The dimmer shall be protected against over currents, and withstand inrush currents, hot-patches and short circuits of 0.02 ohms or more without damage.

J. The dimmer shall employ fully magnetic primary circuit breakers, UL listed, rated at 100% capacity, with must trip capacity @ 125%.

K. Except for circuit breakers, the module shall contain no moving parts.

L. The module shall employ a heatsink with thermal sensor, and silicon-controlled rectifiers. The SCRs shall be configured in inverse parallel. The solid state switch devices shall be mounted in substrate designed for maximum heat dissipation. The devices so mounted shall include an optical isolator, a snubbing network, and necessary gating circuitry on the high voltage side of an integral, optically coupled control voltage isolator providing a minimum of 2500 V rms. Isolation between line and control in the switch device.

M. The solid state module shall be thermally protected independent of the control module. There shall be a shut down circuit. The circuit shall activate when the heatsink temperature exceeds 85 degrees centigrade. This circuit shall restart automatically when temperature drops to safe levels.

N. All load circuit wiring shall be constructed of tin-coated, stranded copper wire, encased in insulation, in compliance with the National Electrical Code in all applicable specification.

O. The module shall be recognized by Underwriters Laboratories.

P. The module shall carry two dimmer circuits of 20 amps each. Each circuit shall carry a maximum of 32 ballasts.

Q. Performance: The dimmer shall operate over an input range of 90-140 VAC, 50/60 Hz, unless otherwise specified at the time of manufacture.

R. The standard dimmer shall have an insertion voltage drop of no more than 3.4 volts rms. At the maximum rated load with 120 VAC input. The 2.4kw rated SCR heat loss shall not be greater than 100 BTU per hour per kilowatt of connected load.

S. The dimmer control voltage shall be internally switchable at 0-10 and /or 0-120 volts. The dimmer shall be designed for use with digital memory controllers employing USITT standard DMX 512 protocol.

T. The module control connectors shall be constructed such that a module of a greater capacity cannot be substituted nor operated in that position.

U. The dimmer curve shall be any one of the following: conform to the Square Law, Linear curve, or such a profile as is digitally programmed by the user. Any given control setting shall give the same dimmer output regardless the direction of control movement.

V. The dimmer shall also function as a non-dim or dimmer for incandescent and inductive loads.

3.05 EMERGENCY TRANSFER RELAY & ENCLOSURE

A. The emergency transfer assembly shall consist of, but not be limited to the following: The enclosure shall not exceed 24" wide x 8" deep.

B. The enclosure shall surface mount.

C. The cabinet shall accommodate 4,6, or 8 – 20 Amp circuits for transfer to the emergency power source.

D. Transfer relay(s) shall be dual pole per circuit, transferring both the hot and neutral of each circuit.

E. Emergency transfer systems that utilize low voltage control signals to "force" dimmer control circuits to full shall not be acceptable.

F. Operating voltages shall include 120/240/VAC, 120/208VAC, 240/415VAC, 277/480VAC.

G. Mounted on the face of the enclosure shall be a push-button for testing the transfer relay(s).

H. There shall be indicators to show "Normal Power" and "Emergency Power".

I. The cabinet shall have a locking door to prevent unauthorized access.

J. The enclosure and relays shall be U.L. listed 1008. Proof of listing must be furnished with submittal drawings. Due to the life safety issues involved, no other means of emergency transfer shall be acceptable. Only those means that are U.L. listed under 1008 shall be acceptable.

K. The cabinet and relay shall be Electronics Diversified, Inc.'s Emergency Transfer series.

L. PROVIDE: UL1008 EMERGENCY POWER TRANSFER CABINET, CONFIGURED AS (2 CKT, 120v, FLUORESCENT). FLUORESCENT BALLASTS MUST BE (2-WIRE OR 3-

WIRE). THIS SURFACE MOUNT CABINET IS TO BE CONFIGURED TO RECEIVE (2) EMERGENCY FEEDS (20A) FROM A SOURCE UPSTREAM, BY OTHERS. NO TIMER DELAY RELAYS REQUIRED, NOR A 3-PHASE POWER FEED BLOCK. ALSO REQUIRED SHALL BE PHASE SENSING PROVISIONS (FUSE BLOCK KIT) TO BE INSTALLED INTO THE EXISTING DIMMING RACK.

Provide the Following:

Qty.	Description
1	MX-48 Rack
1	Hand Held remote control keypad with LCD display
1	Control Module
47	MX-dual 2.4 SCR Dimmer Module, 350 Microseconds
1	Universal Fluorescent MX Dimmer Module
0	Air Flow Module (Single-Slot)
1	Emergency Power transfer cabinet (see drawings)

3.06 CONTROL CONSOLE

A. Bijou PLUS Control Console - General Description: The Bijou control console shall be a high-speed microprocessor-based lighting control system designed specifically for theatrical and television dimming systems.

B. The system shall have the capacity to address up to 512 control channels and 1024 dimmers incorporating USITT standard DMX512 protocol.

C. All principal control electronics shall be of plug-in design, with locking connectors as required, housed within the low-profile console. Not including SVGA drivers and channel cards, the maximum number of printed circuit boards shall be two. All control outputs shall be based on locking-style connectors, insuring positive connection.

D. Console dimensions are:

Memory: 21” Lx15.5”W x 4.5” H
24-Channel: 36” L x 15.5” W x 4.5” H
48-Channel: 60” L x 15.5” W x 4.5” H

E. The console shall be designed to generate a graphic quality SVGA output signal for a detached color CRT for display of all control functions and information status. Display colors shall alert the operator to active operating conditions.

F. The system shall require only one CRT for operation. The SVGA driver card shall be of standard computer design and plug-in replaceable.

G. The controls in the console shall be logically grouped into keypads, push buttons and linear potentiometers designed for numeric input, function selection, and manual controls for automated playback. All controls shall be clearly presented for easy selection in a low-light setting.

H. The console shall not require the use of any periphery device for operation. The operating program shall be stored in a programmable read-only memory. In the event of power failure, a ten-year lithium battery shall retain random access memory.

I. The console shall be equipped with a 3.5” high-density disk drive for recorded information storage. The set-up menu shall allow user access to disk functions.

J. Standard Features: The console shall be provided with the following as standard features for consistent operation:

1. One high-resolution Super VGA graphic quality detached color CRT for display of, and access to, the addresses of system parameter screens, while displaying fader and cue status information to include:
   a) Stage: For channel, fader, and cue information. At minimum the screen shall display 200 control channels; fader operations; effects activation information, and system identification.
   b) Cue: for review and address of recorded cue information without affecting the existing stage picture. Screen shall allow for revision of cue type, channel levels, up time, down time; up delay time, and down delay time.
   c) Submaster: for review and modification of submaster information. Screen shall allow for medication of channel levels, submaster type (normal, inhibited, solo), up time, dwell time, and down time.
   d) Cue List: for display of all cue command line information. Display shall present cue number, cue name, up and down times, up and down delay times, and cue link information.
   e)Track: for display of cues and levels in a spreadsheet type format.

2. Additional displays:

   a) Patch: for organization and review of dimmer-to-channel assignments. Patch shall have two styles of display: patch by dimmer and patch by channel. The system shall have two distinct patch tables.

   b) Profile: up to 25 profiles shall be selectable and assignable to dimmers. Profile shall allow the shape of the fade to be altered and assigned via the patch table.

   c) Setup: For selection of system parameters. Set-up shall allow the establishment of defaults parameters such as default tracking, default preset, default cue times. Setup will allow the initiation of remote monitors, designer’s remotes, hand-held remotes, and initiate actions at additional system compatible memory units such as SubCommander or CopyCat dimmer electronics and stage manager’s panels.

   d) Cue List: For a summary of cue names and numbers.

   e) Sub List: a numeric keypad shall be used to enter information to create channel, submaster, cue, effect lists, and command line information. These keys shall have the capacity to select or edit information in the primary screens.

3. Additional Keys:

   a. The system shall include display keys, which quickly access a minimum of eleven distinct screens for console status. The active cue and fader status along with the current and next cues shall be present in the Stage screen.

b. Information keys shall offer direct access to commands and routines used in the organization and replay of recorded information to include:

1) Update: for immediate re-recording of cue level formation from any stage composition.

2) Flash: for channel identification.

3) Next/Last: for CRT repositioning.

4) Macro #: for executing Macro called.

5) Cue Only: Shall record information into the current cue on a "this cue only" basis.

4. The system shall include a command keypad to address the attributes of cues, and submasters. These keys present information on either a last action or highest-takes-precedence basis.

5. An action keypad shall include oversized GO and STOP buttons as well as LOAD and FADE RATE keys that initiate or modify actions. There shall be a principal cue radar section, which includes two sets of crossfaders, and a master with blackout switch.

6. The system shall include a submaster section with twenty-four linear sliders with bump buttons and tricolor LED's, which can be assigned to operate in either pile-on or inhibitive status. Submasters can contain specific cues, channels, or any combination thereof, with a manual or timed status. The color of the LED's shall indicate the status and type of record loaded without the CRT.

7. The system shall offer a dedicated HELP key.

8. There shall be a high-inertia proportional rotary encoder with a textured surface, which can address or take control of channel levels for individual or mastered control of input or output information.

K. Operating Functions: The control console shall provide the functions outlined for minimal operation:

1. There shall be a configuration set-up menu to display options for operation to include: user specific clear commands, load and save functions, activation of remote inputs, real-time clock, submaster functions, standard level adjustments, basic disk and print functions, and diagnostic functions. Operating parameters shall be changeable without clearing memory assignments.

2. A patch feature shall allow the user to assign one or more dimmers to a channel at a specified level. Any dimmer may be assigned as a non-dim.

3. Twenty-five user-programmable profiles can be assigned, which allow actual outputs to be programmed with a minimum of twenty steps.

4. Dimmers may be isolated from assigned channels and held at user specified levels where outputs are exempt from the recording cue process.

5. Control channel lists can be constructed by cursor positioning and the use of: and, thru, except, at, full, clear and enter keys, in combination with numeric values.

6. It shall be possible to capture the current stage output or contents of selected channels, or cue blocks for modification, on the wheel. Selected channels may be held at existing values while others are forced to zero. Channel levels shall be altered in a single cue only, or may track through a series of cues. The display shall indicate the status of any channel addressed or recorded. Channel levels may be set, modified, or displayed in either stage or preview modes.

7. Channels shall be assignable to submasters in cue configuration, or a direct basis without any other record feature. Information assigned to submasters can be played back by either manual or timed modes. Timed submasters can be stopped and restarted. An overall dwell time as well as up and down times can be defined in timed submasters. Displays shall support an alphanumeric label.

8. Any combination of selected channels and submaster inputs can be recorded into a cue action. Cue actions can have separate up and down times, with delays up to 100 minutes. Cues can be recorded in any order. Up to nine cues can be inserted between any two whole numbers. Each cue can be assigned an alphanumeric label. Attributes assignable to cues are: auto start, manual, preset, track, and link too.

9. A track sheet display shall identify any channel addressed in a cue as either active or passive. It shall be possible to edit cue name, type, and time information with global effect in the track sheet. Additionally, it shall be possible to edit channel levels.

10. A cue sheet display shall be provided which lists cues in numeric order with command line and label information.

11. Recorded information may be played back on the principal faders in either a manual or timed mode by selecting the GO command. Timed cues assigned to a fader may be stopped, reversed, or converted to manual on command.

12. Submasters: Submasters may be initiated in manual or timed mode. A tricolor LED shall identify active Submaster controlling channels. Green LED shall indicate that the Submaster contains manual channel levels. Amber LED shall indicate that the Submaster contains an effect. Red LED shall indicate that the Submaster has been designated as an “inhibitive” or solo submaster with channel information.

13. The channel lists contained in a submaster can be viewed in the sub display with current fader information present. The Submasters shall support a minimum of 24 pages (288 records) of information. A display shall identify the labeled information and the status of any submaster at any time.

14. There shall be the capacity to initiate a series of up to 20 keystrokes, which define an action through a macro command. Macros shall be initiated by start-up, or direct key input with a capacity for 2500 recorded sequences. Macros can be initiated by inputting the Macro

number through keystroke action. A Macro may also be assigned to initiate in any cue via the "CUE LIST" screen.

L. Effects:

1. Each effect shall contain up to 100 steps consisting of channels with levels.

2. Each effect can be recorded with any combination of attributes, including chase, bounce, random, and invert.

3. Effects can be loaded onto submaster handles.

4. Effects may also be activated for a cue using the "Special" Macro Command.

5. Up to 12 effects can operate simultaneously.

M. Internal diagnostics routines shall be available in the setup screen. The diagnostics shall test memory; disks read and write functions, key inputs and video drivers.

N. It shall be possible to download presets directly from the control console to a remote secondary control console. These include, Sub Commander, CopyCat, and the MX dimmer control back-up locks.

O. Options:
Off-line Editor
Hand-held Remote
Midi In & Out Communications Ports
SMPTE Input Port
Designers Remote
Remote Video Receiver
"CF" Moving Lights Outrigger
DMX In
RS232 Port

P. Warranty: A complete two – (2) year warranty covering all parts and labor shall be provided for the control console and its peripheral devices. All software updates to the console released during the warranty period of the console shall be available to the owner free of charge. It shall be required of the owner that a warranty registration card be completed and sent to the manufacturer in order to validate the warranty.

Provide The Following:

Qty.	Description
1	Bijou Plus 48/96 with Power supply
1	Color Monitor with Black Chassis to Match Console
1	Console dust-cover
1	Monitor dust-cover
1	25' DMX/CMX Control Cable
1	100' DMX/CMX Control Cable
3	Flush Control In Connection Wall Plate (located: booth, apron, and rack)

3.07 STAGE MANAGER'S PANEL

Six channel
One master
One take-control
One walk-thru lock out
One keyed access control
Provide one at stage left

3.08 ENTRY STATION

One channel
Locking cover
Provide three (rear of auditorium, upstage wall, and auditorium right door).

3.09 DISTRIBUTION

A. Plug in boxes:

Altman #PB-4-P-GPC-P. Provide 6 at tormentor positions.
Altman #PB-3-P-GPC-P. Provide 22 at catwalk positions
Altman #PB-4-P-GPC-S. Provide 5 at stage walls.
Altman # PB-2-P-GPC-P. Provide 6 at FOH1.
Altman #PB-2-P-GPC-P. Provide 8 at FOH2.
Altman #PB-4-P-GPC-P. Provide 1 front tormentor positions.
Altman #PB-4-P-GPC-P. Provide 2 Rear tormentor positions.
Altman #PB-3-P-GPC-S. Provide 1 at stage walls.

DMX Cable as required
SO cable as required

B. Connector strip: Altman #300 with pigtails and single pipe hangers. Provide strips as shown on drawings.

C. Extension cables: Provide twelve 25'0" extension cables, twelve 6'0" extension cords, and twelve twofers.

3.10 FIXTURES

A. All fixtures shall complete with plug-ends, lamps, color frames, pipe clamps, and safety cables.

B. All fixtures shall be as manufactured by Altman Stage Lighting Company.

C. All fixtures shall be installed, complete ready for use.

D. Provide (40) #65Q

E. Provide (12) #Starpars with four lenses

F. Provide (8) #360Q-4.5x6.5 ellipsoidals

G. Provide (12) #360Q-6x12 ellipsoidals

H. Provide (12) #360Q-6x16 ellipsoidals

I. Provide (12) #360Q-6x22 ellipsoidals

J. Provide (12) #S6-5 ellipsoidals

K. Provide (12) #S6-10 ellipsoidals

L. Provide (12) #S6-20 ellipsoidals

M. Provide (12) #S6-30 ellipsoidals

N. Provide (12) #S6-40 ellipsoidals

O. Provide (12) S6-50 ellipsoidals

P. Provide (12)#S6-1535Z zoom ellipsoidals

Q. Provide (12) #S6-3055Z zoom ellipsoidals

R. Provide (6) #SKY-CYC-02H

S. Provide (3) #R40-6 with 3 circuit, 6 pigtails (3 in, 3 out installed). Border lights shall be 12 circuit, three color (red, blue, green roundels on 6" centers). A total of 18 pigtail receptacles on 6 circuits shall be incorporated into border lights.

T. Provide (12) #Q-LITE to be utilized as work lights

U. Provide (2) # COMET follow spot

A. All fixtures shall complete with 2P&G plug – ends, lamps, color frames, safety cables, and toolless pipe clamps.

B. Fixtures shall be as manufactured by Atman Stage Lighting Company of specified equal.

C. All fixtures shall be installed, complete ready for use.

D. Provide (54) #65Q – Lamp (59) #BTN 750W. Alternate Fixtures: ETC ParNel, 6" Colortran Theater Fresnel

E. Provide (26) #S6-20 ellipsoidal – Lamp: (18) #GLA 575W. Alternate Fixtures: ETC 19 Degree Source Four, Selecon Pacific 20 Degree

F. Provide (12) #S6-30 ellipsoidals – Lamp: (24) #GLA 575W. Alternate Fixtures: ETC 26 Degree Source Four, Selecon Pacific 30 Degree

G. Provide (12) #S6-40 ellipsoidals – Lamp: (13) #GLA 575W. Alternate Fixtures: ETC 36 Degree Source Four, Selecon Pacific 40 Degree

H. Provide (14) #S6-50 ellipsoidals – Lamp: (15) #GLA 575W. Alternate Fixtures: ETC 50 Degree Source Four, Selecon Pacific 50 Degree

I. Provide (3) #S6-Zoom ellipsoidals – Lamp: (3) #HX755 750W. Alternate Fixtures: ETC 50 Degree Source Four Zoom, Selecon Pacific 50 Degree Zoom.

J. Provide (9) #LED-CYC. Alternate Fixtures Provide (18) fixtures mounted above and below.

K. ETC Selador, Vivid, Color Kinetics Color Blaze 72

L. Provide (6) L&E #WKLT-Q to be utilized as work lights. Alternate: Any equivalent fixture – 575W or less with a 200 hur lamp life and ±60 Degree field angle with ± 12,000 fc.

M. Provide (2) Par 64 MFL to be utilized as work lights. Alternate: Any equivalent fixture with a 100w 4000hur lamp life and 45 degree field angle ± 19,000fc.

N. Provide 10% of all theatrical fixture lamps (rounded up) to owner at the time of training.

3.11 MISCELANEOUS

A. Furnish gridiron junction boxes

B. Furnish kelums properly sized for SO cables

C. Furnish and install cable cradles properly sized for SO cables

D. Furnish SO cables for electrics

E. Furnish back boxes for stage manager panel, control stations, control receptacles, and peripheral controls.

F. Furnish (2) 12’0” Tormentor Pipes of welded construction, 1 ½” schedule 40 pipe, shop painted flat black.

G. Furnish and install FOH Fixture Cages to accommodate five ellipsoidals and plug-in boxes. Cages shall be 6’0” long x 3’6” wide x 3’6” deep. Cages to be constructed of a structural steel angle frame with integral pipe batten. Side Panel facing the audience shall be hinged to provide easy access to the lamp end of the fixture as well as for focusing. Hinged Mesh shall be heavy gauge wire to protect fixtures from objects including baseballs, soccer balls, and basketballs. Cages shall be securely and rigidly mounted to roof steel. Cages shall be painted black in their entirely. Cages shall be as manufactured by Pittsburgh Stage, Inc. Provide three (3).

H. Furnish 100 sheets of 20” x 24” color media by Apollo.

I. Furnish 20 standard pattern holders provided by the fixtures manufacturer.

PART 4 - EXECUTION

4.01 CUTTING AND PATCHING – PREPARATION

A. The Contractor shall do all required cutting, drilling, tapping and fitting to properly install and secure his work in place. Cutting or drilling existing structural work shall have prior approval of the Owner/Architect/Engineer.

4.02 INSTALLATION OF EQUIPMENT

A. The equipment schedule, design and locations of all stage equipment including the lighting are the sole responsibility of this stage equipment contractor. Install equipment in accord with manufacturer's published instructions.

B. All other trades shall closely coordinate their work so as not to impact or conflict with the location and design of the stage equipment.

4.03 CLEANING

A. During the course of this work, the Contractor shall daily remove to collection points at the job site all looser trash and scrap materials.

4.04 TESTING, INSPECTION, AND ADJUSTMENTS

A. The completed installation of all equipment properly installed, shall be tested and operated for the approval of the Owner/Architect/Engineer.

B. Any workmanship or materials found to be defective, improperly placed, not in strict conformity with the specifications, or defaced or injured through the action of fire or the elements, through usage by the Contractor or his employees, or from any other cause shall be removed immediately from the premises when directed by the Owner/Architect/Engineer.

End of Section