

THEATER SAFETY

**A Guide for Students, Teachers,
Administrators, Parents, and
Community Users of School
Auditoriums and Stages**



Loudoun County Public Schools

INTRODUCTION

Theater Safety has been developed for students, teachers, administrators, parents, the community, and others involved in the use of the school auditorium, the use of stage equipment, or the manufacture of scenery. These guidelines address technical areas that are critical to the safe operation of theaters. Persons using *Theater Safety* should read the entire document initially to gain an overview of its content. Subsequently, use it as a reference for day-to-day operations.

Questions regarding any aspect of the guidelines may be addressed to the English Office (571-252-1330).

It is recommended that a crew member be appointed the Safety Manager, responsible for monitoring safety conditions and reporting unsafe practices to the director. The director is ultimately responsible for crew and audience safety.

Some guidelines in this manual may seem inconvenient or difficult to implement. Nevertheless, theater users are expected to follow these guidelines specifically. The safety of the cast, the crew, and the audience is everyone's first responsibility. *When in doubt, call the Office of Facilities Services (571-252-9260) first!*

This manual was prepared by personnel from the LCPS Departments of Instructional Services, Safety and Security, Facilities Services, and Risk Management. Several LCPS drama teachers reviewed the manual and made helpful suggestions. Grateful acknowledgement is made to Fairfax County Public Schools for permission to incorporate specific information from their theater safety manual.

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CRITICAL SAFETY INSTRUCTIONS

The most hazardous situations referred to in this manual are listed here. Theater personnel should be thoroughly familiar with these situations.

BATTENS – An adult supervisor must be present or nearby when any batten is being raised or lowered.

CATWALK – Technicians should never enter the catwalk area without an adult’s permission.

DAMAGED EQUIPMENT – Do not make repairs to damaged equipment. Immediately remove it from service and tag it “Dangerous, Do Not Use,” with a brief explanation of the problem. Report the problem to a school administrator, who should submit a work order to the Office of Facilities Services.

DUST MASKS – Technicians must wear dust masks when working with power sanders or spray paint. Do not share dust masks, as they can spread infection and disease.

ELECTRICAL CABLES – Do not use masking tape or duct tape to secure electrical cables. Use only electrical fastening devices, e.g. wire ties or electrical cable hangers.

ELECTRICAL EQUIPMENT – Never hot-patch electrical equipment. All repairs must be performed by a certified electrical technician. A school administrator should submit a work order to the Office of Facilities Services.

EXTENSION CORDS – Never use an ungrounded two-wire extension cord. If two or more extension cords are “daisy chained,” care must be taken so that the cord junctions are tight and do not touch any surface that can conduct electricity.

FABRICS – All fabrics used on-stage must bear the manufacturer’s certification that they are flame retardant. The application of post-manufacture flame retardant chemicals is not sufficient protection against fire and is prohibited by the Fire Code.

FIRE EXTINGUISHERS – Adult school employees are the only persons permitted to use fire extinguishers. No students or adult volunteers are permitted to use fire extinguishers.

FOG MACHINES – Fog machines must be tested and approved by the Office of Safety and Security before they are utilized. Fog machines are prohibited in elementary schools, as the ceilings are too low and the smoke detectors will be activated by the fog.

FLASH POTS – The use of flash pots and other incendiary devices is prohibited.

GLASS – Never use glass windows for stage scenery.

GLOVES – Wear temperature resistant gloves when working on lighting equipment and category zero gloves for other electrical work. Wear leather gloves when handling heavy equipment or scenery.

HARD HATS – Always wear a hard hat on stage when someone is on a catwalk, ladder, powered lift, or scaffold. Always wear a hard hat when serving as a spotter.

ITEMS BEING RAISED OR LOWERED – Never stand beneath items being raised or lowered. Never use a pulley device to raise or lower lights or heavy equipment.

LADDERS – Use only A-frame ladders. If ladders have extensions, the locking mechanisms must be inspected regularly. Never use a straight ladder.

LIFTS – Technicians who use power-driven scissor lifts or battery powered lifts must be first trained by the Office of Facilities Services.

MAKE-UP APPLICATORS – Do not share make-up applicators or sponges, as this may spread disease.

PLATFORM HEIGHT – Platforms higher than 3 feet must be constructed according to industry standards.

NAILS – Nails should never be used to join parts of a platform or other stress-bearing structures.

PAINT – Spray paint and oil-based paints require exhaust ventilation or outdoor use. Appropriate personal protection equipment must be worn when using these paints.

PYROTECHNICS – The use of pyrotechnics is prohibited.

RIGGING – Never use sprinkler pipes or plumbing pipes to support any rigging.

SAFETY GLASSES – Always wear protective safety glasses when working with power tools or spray paint.

SAWS – Hand-held circular saws, radial arm saws, routers, band saws, and panel or table saws are prohibited for student use.

STAGE EXTENSIONS – Designs for extensions of the stage must be submitted to the Office of Safety and Security for approval before construction begins. The distance between the forward edge of the extension and the first row of seats must not be less than the width of the nearest exit doors.

TRAP DOORS – Any trap door that will be used as part of a platform on which persons will walk must have its design approved by a civil engineer from the LCPS Department of Construction prior to construction, and it must be inspected by the same before the first rehearsal use.

WINCH BATTENS – No alterations or adjustments to the permanently installed components of a winch batten may be made. No electrical wiring or flammable material may be hung from a winch batten. An adult supervisor must be on stage when a winch batten is raised or lowered.

AUDIO

Theater audio systems are standard equipment in all high schools. In addition, most high schools have purchased intercom systems that allow communication among technical personnel during a performance. The equipment involved is delicate and can easily be damaged by erroneous wiring or misuse.

The following are specifications and guidelines with regard to theater audio systems:

Alterations and Repairs – No alterations to the permanent audio system may be made.

Certification – Technicians working with the theater audio system must be trained on the use of the system and have a current parental permission form, if appropriate, on file.

Electrical Shock – To prevent possible electrical shock, do not touch breakers or remove equipment panels and other protective hardware. Only building engineers or electricians may access this equipment.

Permissible Adjustments – Adjustments to the audio system are allowed but are limited to the following, at the director's request:

1. Adjustments to rack-mounted controls or settings, such as volume, equalization, and channel selector.
2. Patching cables to the auxiliary inputs and outputs of the table top (non-rack mounted) mixers
3. Plugging in and placing microphones, cables, stands, and speakers

Any other adjustments to sound systems and settings must be approved by the school drama teacher or a school administrator.

Sound Levels – Do not allow the audience to be exposed to a 95 decibel, “A” weighted scale (dBA) level output (or greater) for more than 90 seconds. If an amplified music concert is anticipated, a sound pressure level meter, available at electronic supply stores, is the device that should be used to determine decibel output.

Unauthorized Connections – Do not connect unauthorized sound equipment or devices.

CATWALKS

Catwalks can be extremely dangerous areas for technicians working on them, cast and crew members on stage, and persons seated in the audience. Technicians on catwalks can suffer serious injury or death as a result of falls. Walking, sitting, or leaning on any surface that is not the actual catwalk is extremely dangerous; the catwalk itself is the only surface that can support a person's weight. Additionally, injuries can be caused by any structural steel, conduit, or ductwork that is crossing or otherwise obstructing the pathway of technicians. Objects such as lighting equipment, tools, hardware, and personal pocket items can become lethal projectiles when dropped, and technicians unaware of them can dislodge such items left unsecured on a catwalk.

The following are guidelines for using catwalks safely:

ACCESS TO THE CATWALK

Capacity – Students should never enter the catwalk area without an adult's permission.

Certification – All persons working on the catwalk must be certified for access by the drama teacher or auditorium coordinator for the school. Certification requires parental permission, prior training, and supervised experience in the theater.

Security – Keep the door(s) to the catwalk area closed and locked when the catwalk is not in use. If doors do not have locking devices, the building engineer must be advised to have locks installed.

Supervision – A drama teacher must be in the theater area when student technicians are working on the catwalk.

WHILE WORKING ON THE CATWALK

Drop Hazard Prevention – Technicians should empty pockets of all loose items prior to beginning work on the catwalk.

Hoisting Equipment to the Catwalk – Use a sturdy rope to raise and lower lighting instruments to the catwalk. Smaller items should be carried up by the technician, or placed in a plastic bucket attached to the hoist rope. *Do not allow anyone to stand beneath items being raised or lowered.*

Leaving the Catwalk – Do not leave the catwalk to crawl along the roof trusses or to walk out on the ceiling for any reason.

Projectiles – Never throw or drop any item from the catwalk.

Safe Work Practices – While working on the catwalk, take responsibility for the safety of audience members, performers, other technicians, and self. Focus full attention on working safely at all times

Use of Tools – All tools carried on to the catwalk must be secured to the technician's body or the building structure with safety tie lines to prevent accidental dropping.

STORAGE AND INSTALLATION OF EQUIPMENT ON THE CATWALK

Obstructions – All obstructions should be clearly marked with glow paint or glow tape and padded when necessary.

Storage – Any equipment stored on the catwalk must be secured with safety tie lines and may not obstruct access to any part of the catwalk. Do not store any items in the catwalk area that do not pertain to catwalk operation, or that might interfere with work on the catwalk.

Overhead Lighting – All overhead lighting fixtures must be shielded and in proper working order. Many accidents happen due to poor lighting or exposed light bulbs. Please see the school's building engineer to correct any of these conditions.

Use Safety Cables – Attach all lighting instruments, including those not in use, to the catwalk by safety cables. Safety cables are of critical importance for lighting instruments hung above the heads of members of the audience.

INAPPROPRIATE USE OF THE CATWALK

DO NOT –

1. use the catwalk as a lounge or a place to sleep.
2. bring food or drinks onto the catwalk at any time.
3. leave packaging containers, empty boxes, or any trash on the catwalk.
4. make any alterations or renovations to catwalks.

CURTAINS

Curtains are common to most stages. They are used selectively to reveal areas of the stage or scenery and to mask the backstage areas and overhead equipment from the view of the audience. Some types of curtains are used as scenery, such as painted backdrop, cyclorama, and scrim curtains. Through misuse and carelessness, curtains can easily be damaged or become a fuel source for a fire.

TYPES OF CURTAINS

Borders (also called Teasers) – Valance curtains that are hung above the stage and serve to mask the overhead equipment from view of the audience. These are usually made from black fabric and are hung on pipe battens fixed at a permanent height above the stage. The first border curtain that masks the main act curtain track is usually the **Grand Teaser** and is made from the same color and type of fabric used for the main act curtain.

Cycloramas (also called Cycs) – These curtains cover the width of the stage and are usually hung furthest upstage (away from the audience). They are most often off-white in color, although some are sky blue. They are sewn flat with no pleats and are used as a surface to project washes of colored light.

Legs (also called Tormentors) – Curtains that are hung at each side of the stage to mask the backstage wings from view of the audience. They are that are usually made from black fabric. Legs are usually hung on a pipe that is attached to a roto-drapeer that allows the curtain to be rotated on its vertical axis. The roto-drapeer travels horizontally on a track to allow further adjustments.

Scrim – These curtains are made from a seamless, open weave, black or white material. They are used to visually soften and blend the lighting on cycloramas and can also be used to dramatically reveal or hide an area of the stage, depending on how it is illuminated.

Traveler Curtains – Traveler curtains are hung on wheeled carriers that travel on a track, operated by a rope and pulley system or pulled by hand. These curtains include the **Main Act Curtain**, (also called the Grand Drape), and mid-stage and upstage dividing curtains.

GUIDELINES FOR USE OF CURTAINS

Adjustments – Only the following adjustments may be made by stage technicians:

1. Opening and closing of traveler curtains
2. Rotation and horizontal tracking of leg curtains
3. Temporary removal of legs, borders, and cyclorama curtains

Alterations and Repairs – School or community personnel may not make any alterations to individual curtains or to the devices to which they are mounted.

Decorations – Attaching decorations to any curtain is prohibited.

Fire Prevention – Stage lights can become very hot. Therefore, curtains must not be positioned closer than 18 inches to the rear or sides of any stage light, and no closer than four feet to the front (lens) end of any stage light.

Flame Resistant Material – All curtains must be manufactured from flame resistant fabric and must bear the manufacturer's label attesting to this fact.

Flame Resistance Testing – When requested by the Fire Marshal, the Office of Risk Management will determine the flame resistance of any temporary or permanent curtain. A small sample will be removed from the curtain and subjected to the match flame test as described by the National Fire Protection Association. The Office of Safety and Security (571-252-1740) maintains fabric flame resistance certificates.

Installation – All curtains, and the devices to which they are mounted, must be professionally manufactured and installed.

Painted Backdrops – Painted muslin fabric backdrops must be flame resistant and must bear the manufacturer's label attesting to this fact. Painted backdrops can be hung from border curtain battens or traveler tracks. Backdrops must not be hung from lighting battens unless all lighting instruments have been removed.

Protection – Only trained stage technicians may adjust curtains. Avoid using excessive force to adjust curtains. Avoid activities such as sawing lumber or painting scenery in close proximity to curtains. Use care when moving scenery and risers or rolling pianos near curtains. Particular caution must be used to protect scrims, as this type of curtain is expensive and very delicate. A minor snag will ruin the effectiveness of the entire scrim.

Removal – Curtains may be temporarily removed under special circumstances, such as for replacement with painted drops or avoidance of tall or wide stage scenery. Curtains that are to be removed should be untied from the pipe or unhooked from the carriers. Hardware such as bolts, chains, roto-drapers, tracks, and battens must not be tampered with. Curtains that are temporarily removed must be carefully stored in curtain bags to protect them from dirt and physical damage. Curtains must be restored to their original location as soon after the event as possible.

Rented Curtains and Backdrops – All rented curtains must be flame resistant and must be so labeled by the manufacturer. If not labeled, the director must obtain a certificate of flame resistance from the rental company and have it available for inspection by the Fire Marshall or the Office of Safety and Security.

Roller Drops – Roller Drops are devices that roll a backdrop from the bottom up. These devices can be installed on a temporary basis only and must be removed after the final performance. Roller drops must be flame resistant. Roller Drops must not be hung from lighting battens unless all lighting instruments have been removed.

Temporary Curtains – Curtains that are part of a stage set do not have to be professionally manufactured and installed, but they must be made of flame resistant material. They must be so installed as to pose no risk to actors entering or leaving the set through them.

DOOR WARNINGS

During productions, the following warnings, when appropriate, are to be posted on entrance doors and printed in the program:

Fog Effects

“WARNING: This production includes an AEROSOL SIMULATED FOG EFFECT. This fog is intended for public performances, but persons who are asthmatic or who are allergic to dust should identify themselves to house personnel so they might be seated where there is the least possibility for discomfort.”

Gunshots

“WARNING: This production includes one or more LOUD GUNSHOTS. It may be disturbing or harmful to some persons with an emotional disturbance or abnormal heart condition.”

Lasers

“WARNING: LASERS are being used in this area. The equipment makes it possible under certain conditions to produce a STROBOSCOPIC LIGHT EFFECT that might prove disturbing or harmful to persons suffering from epilepsy.”

Strobe Effects

“WARNING: This production includes a STROBOSCOPIC LIGHT EFFECT that might prove disturbing or otherwise harmful to persons suffering from epilepsy.”

Very Loud Music or Noise

“WARNING: This production includes VERY LOUD MUSIC OR NOISE. It may be disturbing or harmful to some persons.”

FIRE SAFETY

Theaters and auditoriums concentrate large numbers of people in single rooms. It is of critical importance that procedures for ensuring fire safety are in place and observed. The following are guidelines for preventing and reducing fire losses and casualties:

Access to Emergency Equipment – Ensure that there is clear access to fire alarm manual pull stations, fire extinguishers, and fire blankets (if applicable) at all times.

Aisles – Keep aisles completely clear. Make sure that all routes to exit doors (aisles and other exit access ways) are at least 44 inches wide at all points and are kept free of obstructions (equipment, card tables, and the like) at all times. (See also **Non-fixed Seating**.)

Alarm Boxes – Pull-alarms should not be blocked; there shall be full access to them at all times, and they should be readily visible.

Audience Instructions – Prior to the start of each performance or event, inform the audience of the locations of the auditorium exits to be used in the event an emergency evacuation is required.

Calling 911 – In addition to **Sounding the Fire Alarm** (see below), call 911 (the emergency number of Loudoun County police and fire and rescue service), in order to provide details of the situation.

Evacuating the Building – Upon hearing the fire alarm, direct all audience members, performers, and technicians to exit the building and assemble at a point 100 feet from the building.

Exits – Do not disable access to exits. When an auditorium is occupied, all exit doors must be fully functional and accessible. Ensure that **Exit Signs** are not covered in any way (e.g., with paper, color, media, or tape). Immediately correct, or report to the appropriate person, any conditions likely to interfere with the safe exit of any person.

Fire Blankets – (If applicable) Fire blankets, supplied principally for smothering fires on clothing, may be used by adults on small Class A fires (wood, paper, textiles, etc.) in the absence of other extinguishing means.

Fire Extinguishers – *Adult school employees are the only persons permitted to use fire extinguishers.* Students are not allowed to fight fire; they should be immediately evacuated from the building.

Flame Retardant Certification – *All fabrics used on-stage must bear the manufacturer's certification that they are flame retardant.* This applies to flat muslin, curtains, and costumes. Never remove the manufacturer's label. The post-manufacture application of flame retardant chemicals is not sufficient protection from fire.

Fog Machines—*Fog machines must never be used until they have been tested by the Office of Safety and Security.* Before turning-on any fog machine, have it tested. To arrange for a test, call 571-252-1740.

Non -fixed Seating – In cafeterias, gymnasiums, or **Black Box Theaters** used as auditoriums, chair arrangement must conform to the following code requirements:

1. *Aisle width* – All aisles must be a minimum of 44 inches wide.
2. *Aisle termination* – Every aisle must lead to an exit door or to a cross aisle (an aisle running parallel to the seat rows and leading to an exit door).
3. *Distance between rows* – There must be at least 30 inches from the back of one seat to the back of the seat in the next row, measured in a horizontal direction.
4. *Number of seats in a row* – The maximum numbers of seats in a row extending from one aisle to another is 16, and the maximum number of seats in a row extending from one aisle to a wall is eight

Panic Bars – Check exit door panic bars for proper operation.

Pyrotechnics – Pyrotechnics, including flash pots and explosives, are prohibited. No flame of any sort is permitted on stage at any time.

Smoke Detectors – Do not block smoke detectors with storage items, scenery, curtains, or props. A smoke detector must never be covered or disabled.

Sounding the Alarm – Upon discovering a fire, observing smoke coming from the building, or smelling gas, immediately sound the fire alarm without asking permission.

Sprinklers – Do not stack any item (such as boxes, scenery, lumber, costumes, furniture, or props) near a sprinkler head. The Fire Code requires that all materials shall be at least 18 inches from any sprinkler head. **Sprinkler heads** may not be painted or covered in any way. **Sprinkler pipes** are not to be used for hanging items, such as scenery, costumes and tools.

LADDERS

Because it is necessary to adjust stage lighting, assemble and paint tall scenic units, and hang microphones, ladders are essential tools to theater operations. Their use and care must be monitored to protect the safety of the person using the ladder and the persons working on the ground below the climber.

Following are specifications and guidelines for the use and care of ladders:

SPECIFICATIONS FOR LADDERS

Electrical Shock Prevention – Ladders used for lighting or other electrical work must be made of fiberglass or wood. Metal ladders may not be used.

Ladder Types – *Extension ladders or straight single ladders may not be used.* Self-supporting stepladders, platform ladders, or A-frame ladders are acceptable. Ladders with extensions must be inspected regularly to ensure proper operation of the locking mechanism.

OSHA Rating – Ladders for stage use must have an OSHA rating of Type 1 (heavy duty—250 pounds) or Type 1A (extra heavy duty—300 pounds). Ladders having an OSHA rating must be labeled accordingly.

GUIDELINES FOR USE OF LADDERS

Cleanliness – Keep steps and side rails clean and free of all foreign material, including wet paint, mud, snow, grease, oil, or other substances.

Climbing – When climbing a ladder, keep body centered between the side rails and do not overreach. Face the ladder when climbing up or down, and maintain a firm grip using both hands. Climb only on the front side of the ladder, using the rungs or steps, not on the brace side. *Only one person at a time may be on a ladder.*

Damaged Ladders – Do not use ladders with broken or missing steps, broken side rails, or other faulty parts. Immediately withdraw from service ladders that have developed defects. *Do not make repairs to damaged ladders.* Label it with a sign that says “Damaged: Do Not Use” and report it to a building administrator, who will submit a work order to have it repaired.

Inspection – Maintain ladders in good condition at all times. Prior to each day’s use, inspect ladders to ensure that the joints between steps and side rails are tight, all hardware and fittings are securely attached, and moveable parts operate freely without binding or undue play.

Maximum Height – Do not climb, stand, or sit above the second step from the top of the ladder.

Moving a Ladder – Do not attempt to move a ladder while a person is on it.

Painting Ladders – Do not paint ladders with opaque coatings because these disguise splits, cracks, and other defects.

Proper Deployment – Use only ladders that are fully opened, with the spreaders locked in place.

Spotters – Use at least one other person as a spotter when working on ladders.

Securing Tools – Secure tools and other objects against falling while work is being performed from a ladder. Use safety tie lines to attach tools to the body. Never leave tools or equipment on a ladder. Never drop or throw tools or equipment to another worker.

Storage – Store ladders properly indoors, in such a way that they are not subjected to physical abuse, such as storing or dropping heavy items on them.

Substitutes – Do not use a chair, table, or any other substitute in place of a ladder.

Unstable Surfaces – Do not place ladders on boxes, barrels, or other unstable bases to obtain additional height.

Use Near Doors – Do not use a ladder in front of a door that opens toward the ladder unless the door is blocked open or guarded.

Work Area – Use a ladder on a flat, firm base, and keep the surrounding area clean.

LIGHTING

Theater lighting systems are designed for flexibility and heavy-duty use. When properly used, they are safe, not only for the technicians working with them, but also for anyone within the theater environment. However, in the hands of untrained or careless persons, lighting systems can be the cause of dangerous or lethal situations. Previous accidents have included fires, electrical shock, and fallen equipment.

SPECIFICATIONS FOR LIGHTING

Approved Equipment – All lighting instruments must be listed by Underwriters Laboratories (UL) and bear the UL label.

Certification – Technicians working with the stage lighting system must be certified by the director and must have a current parental permission form on file. (Appendix A)

Extension Cables – The only type of cable acceptable for use as an extension cord for a lighting instrument is 12 gauge (20 amp capacity), 3 conductor (grounded), protected with type S, SO, SOO, SE, SEO, ST, STO or STOO insulation. The permanent inscription found on the external insulating jacket can identify the cable type. The acceptable cable mark is “12/3 AWG” followed by one of the letter codes: S, SO, SOO, SE, SEO, ST, STO, STOO.

Note: Cable with the mark “SJ” is not acceptable for use with lighting equipment. The 12/2 SJ or 14/2 SJ cables can be used for audio speakers provided they have the correct type of connectors.

Power Formula—The power formula is used to determine the amount of electrical energy consumed in an electrical circuit. This formula is derived from Ohm’s law and is also called the West Virginia or Pie formula.

W = power in Watts
V = voltage in Volts
A = current in Amperes

$W = V \times A$ - Use this equation to determine watts.

$A = \frac{W}{V}$ - Use this equation to determine amps.

$V = \frac{W}{A}$ - Use this equation to determine volts.

“Pie”

P = power in Watts
I = current in Amperes
E = voltage in Volts

$P = I \times E$ - Use this equation to determine watts.

$E = \frac{P}{I}$ - Use this equation to determine volts.

$I = \frac{P}{E}$ - Use this equation to determine amperes (amps).

Example:

To determine the amperage load of an electrical circuit, the only information needed is the total wattage of the instruments plugged into the circuit. The voltage for all Loudoun County Public Schools theaters can be assumed to be 120 volts. If two 750-watt instruments are plugged into a circuit, the formula is set up as follows:

Formula:

$A = \frac{W}{V}$ (“West Virginia” equation to determine amps.)

W (watts) = 2 x 750 = 1500
V (volts) = 120

$A = \frac{1500 \text{ (watts)}}{120 \text{ (volts)}}$

$$\begin{array}{r} 12.5 \\ 120 \overline{) 1500} \\ \underline{120} \\ 300 \\ \underline{240} \\ 600 \\ \underline{600} \\ 0000 \end{array}$$

A (amperes) = 12.5

GUIDELINES FOR USE OF LIGHTING EQUIPMENT

Alterations and Repairs – No alterations to permanent electrical systems or lighting instruments may be made by school or community personnel. A school administrator must submit requests for changes and repairs to the Facilities Service Office.

Attachment of Accessories – Exercise great care when using a color frame, pattern holder, barn door, or snoot with an instrument. Check to ensure that these items are correctly installed and cannot accidentally slip out of the instrument. Downlights, or instruments that are nearly perpendicular to the stage, are particularly at risk. Keep lens barrels of ellipsoidals and lens doors of Fresnels tightly secured.

Control Board Protection – Do not allow smoking, eating, or drinking in the control booth. Accidental spills have ruined lighting control boards. When the control board is not in use, it must be turned off and its protective cover must be in place.

Dimmer Security – Keep the dimmer rack doors closed and locked while the system is operating. For schools that have fewer dimmers than the total number of lighting circuits, an adult supervisor may open the doors so that the dimmer modules may be re-plugged.

Electrical Capacity – Always be aware of the amp capacities of the different electrical components being used and the wattages of the instruments. Have a thorough understanding of Ohm's law as it applies to the power formula in order to prevent overloading electrical equipment. (See **Specifications for Lighting**, above.)

Electrical Cable Storage – Properly store cables that are not being used. They should be coiled individually, neatly tied or taped, and placed in a location that will protect them from physical abuse, such as being walked on, having scenery stored on them, or having any contact with moisture.

Fire Prevention – Hang instruments with careful consideration given to fire hazards. Do not focus instruments directly onto cables or other equipment. Curtains must not be positioned closer than 18 inches to the rear or sides of any stage light, and no closer than four feet to the front (lens) end of any stage light.

Hanging – When hanging instruments for use, clamp them tightly with a wrench. Mount a safety cable immediately after the instrument is clamped in place. Curtains must not be positioned closer than 18 inches to the rear or sides and no closer than four feet to the front (lens) end of any stage lighting instrument.

Inspection – Inspect each instrument as it is being hung and focused to determine if the equipment is mechanically and electrically safe to use. "Instrument" refers to any type of stage lighting device – Fresnel, ellipsoidal, PARcan, and scoop, strip light, cyc light, etc. Potential problems include the following:

1. Cracked C-clamps
2. Exposed electrical conductors

3. Loose wires of fiberglass insulating sleeve
4. Rattling parts
5. Stripped or missing bolts

Immediately remove from service and equipment found to be faulty. Tag it “Dangerous, Do Not Use” with a brief explanation of the problem. A school administrator must submit requests for changes and repairs.

Instrument Storage – Carefully store lighting instruments to prevent damage. Gently coil the electrical lead to prevent the plug from getting caught and pulled. Push lens barrels and shutters fully into the instrument, and tighten yoke bolts. Store instruments clamped to a storage pipe if possible, but if space does not allow this, place lens end down on a clean surface, out of the way of other activity. Instruments stored on the catwalk must be secured with a safety cable to keep them from falling.

Lasers – Only adults may operate lasers. *Students are prohibited from using lasers.*

Lamp Replacement – When an instrument requires a lamp replacement, take the following steps in the order listed.

1. Turn off the power source for the instrument.
2. Unplug the instrument.
3. Allow the lamp to cool.
4. Remove the old lamp using. Wear temperature resistant gloves, since the lamp may still be warm, the glass envelope might break, or the lamp might still be good if the malfunction is due to some other cause.
5. Check lamp type to be sure that the replacement is of proper wattage, base type, and light center length (LCL).
6. Use clean cotton or plastic gloves to install the new lamp. Do not touch glass envelope with bare hands, since natural skin oils will destroy the quartz glass. If the glass is accidentally touched, wash it off immediately with alcohol and allow to air dry.
7. Make sure the lamp is securely seated and the lamp housing is properly closed. Failure to do this may allow for an electrical arc, which in short time will ruin an instrument. This is a very common cause of instrument failure.
8. Re-plug the instrument into the circuit.
9. Use the dimmer to slowly energize the circuit.

Permissible Adjustments – Adjustments to lighting equipment that are allowed are limited to the following:

1. Changing lamps
2. Changing color media or pattern templates
3. Re-circuiting at the hanging position
4. Re-hanging and refocusing instruments
5. Re-patching at the lighting board
6. Using extension cords

Plugging in Equipment – When plugging an instrument into a circuit, make sure that the power to that circuit is off. *Never hot patch electrical equipment.* (This guideline also applies to inserting a dimmer module into its rack.)

Purchases and Donations – All lighting equipment purchases and donations must be approved by the current drama teacher and must be in compliance with the current LCPS standards for lighting instruments.

Securing Overhead Electrical Cables – When cables are mounted above the stage, secure them properly to keep them from falling. *Do not use masking tape or duct tape.* Use only electrical fastening devices, e.g. wire ties or electrical cable hangers.

Securing Electrical Floor Cables – In order to prevent a tripping hazard, avoid placing cables on the floor if at all possible. If it is absolutely necessary to do this, choose locations that have the least impact on foot traffic, such as the bases of walls or under platforms and risers. When placing the cables, first clean the floor of loose dust and debris, then arrange cables flat on the floor in a smooth, neat manner, and tape down securely with gaffers tape to keep them in place. In areas where scenery pieces or numerous performers must cross, cover the cables with a protective wood curb and gutter or with a commercially available rubber cable cover such as “Flex-I-Duct.”

Strobe Effects – If strobe lights are used for a performance, provide a clearly visible sign at all entrances to the auditorium. See the section on **DOOR WARNINGS**.

Thermal Protection – Since lighting instruments operate at very high temperatures and can cause serious burns, wear temperature resistant gloves while focusing, and exercise extreme caution to protect other exposed skin from accidental burns.

MAKE-UP

The use of theatrical makeup is essential in order to accentuate actors' features or to alter age or physical characteristics. Since cosmetics are applied directly to the skin, the combined hazards of allergic reaction and the introduction of bacteria (particularly to the eyes) are always present. Students should be encouraged to purchase and use individual makeup kits whenever possible/feasible.

The following are guidelines for reducing health risks associated with cosmetics:

Aerosols – Do not use aerosol products in small, poorly ventilated areas.

Allergic Reactions – use hypoallergenic cosmetics for actors with sensitive skin or eyes.

Applicators – An individual, disposable applicator should be used for each actor when applying eye shadow. An individual sponge should be used for each actor if used for the application of foundation. *Do not share applicators or sponges.* Clean all brushes in rubbing alcohol after each use.

Dampening Brushes – Moisten brushes and pencils with clean tap water, not saliva.

Hazardous Ingredients – Avoid using products that are labeled as having hazardous ingredients.

Hygiene – Wash hands before and after applying cosmetics. Wash hands and any applicators before working on another actor.

Ingredient Listing – Use only products that list the ingredients on the label.

Non-cosmetic Products – Use only cosmetic products on skin. Do not use substitutes such as paints or dyes, and do not supplement cosmetics with such substances.

Removal of Make-up – Completely remove cosmetics with makeup remover or cold cream immediately after each performance. Replace lost skin oil with moisturizers.

Sharing Makeup – Do not share lipstick, eyeliner, or mascara with another actor.

Storage – Store cosmetics and applicators in a clean, protected area.

PAINTS AND CHEMICALS

Certain paints and chemicals used in theater are potentially dangerous as health hazards and/or as fire hazards. People working with these substances must know the dangers and take necessary steps to prevent injuries, not only during actual use, but with regard to storage and disposal as well.

The following are guidelines for working with paints and related chemicals:

Application – Use brush paintings, rolling, dipping, or spattering as the preferred method of application whenever possible. Avoid spray application of paint when possible. (See section on **vapors**, below.)

Containers – Use only non-breakable containers that are clearly labeled as to contents and hazards. No glass containers are permitted.

Container Seals – Keep containers tightly sealed to prevent the escape of vapors.

Disposal of Water-based Paint – Dispose of **small quantities** (less than one pint) of casein and latex paints by flushing down a sink with plenty of water. Paint labeled for use on stages, scenery, or display items will generally be water-based. Check label of contents to confirm. Dispose of **large quantities** of casein and latex paint by allowing the paint to dry out in its container and then disposing of the solid remains in a trashcan.

Disposal of Oil-based Paint – Dispose of oil-based paint or mineral spirits by pouring waste into a metal or plastic jug (one-gallon limit). Clearly label the container “Paint Waste,” and notify the Office of Facilities Services (571-252-2960).

Donations – It is the policy of LCPS not to accept donations of any paints or chemicals. *No employee or student should accept donations of paints or chemicals.*

Flammable Liquids – Any flammable liquid must be kept in a 1-gallon or less container. All flammable liquids must be stored in a metal, flameproof cabinet.

Hazardous Products – Avoid the use of products that list potentially hazardous substances in their contents.

Manufacturer’s Instructions – Follow manufacturer’s instructions for use and cleanup.

Material Safety Data Sheet (MSDS) – An inventory of hazardous substances must be filed with the Office of Risk Management and recorded in the MSDS notebook. Know its location. Read and understand the information provided by the MSDS before using a potentially dangerous product. Make sure that an MSDS is on file for every product used that claims to have a health or safety risk. MSDS’s are available from the Office of Facilities Services (571-252-2960).

Skin Contact – Avoid skin contact with paints and solvents. If contact occurs, wash with waterless hand cleaner and/or soap and water. Never use solvents to clean hands.

Storage – Store containers on low, sturdy shelves, and make sure that the label side faces out. Stack no higher than two containers per shelf.

Vapors – Avoid breathing vapors. General dilution ventilation (open doors, fans, building heating and air conditioning system) can be used for acrylic, latex, and artist's oil paints. *Spray paint and oil-based paints require exhaust ventilation or outdoor use. Appropriate personal protection must be used.*

PERSONAL PROTECTION / PROPER APPAREL

Some clothing and accessories worn by stage technicians can create potentially hazardous conditions. Other clothing can contribute to technicians' safety.

Following are guidelines for preventing personal injury:

Arm Protection – Wear long sleeves whenever possible to protect arms from flying splinters and from casual-contact burns from lighting instruments. Button cuffs when working with power tools.

Cotton Gloves – Wear cotton gardener's gloves or disposable cotton film editor's gloves to handle lamps from lighting instruments. (Refer to the **Lighting** section for proper re-lamping procedures.)

Dust Masks – When operating power sanders or when applying spray paint or oil-based paint, wear a dust mask commonly available at hardware stores. Discard disposable masks after use. They must never be shared with other technicians.

Hair and Jewelry – Remove all loose jewelry and tie back long hair prior to using any power tool.

Hard Hat – When helping a technician who is working on a ladder or scaffold, wear a hard hat to protect the head from hardware that might be accidentally dropped. *Do not use a bump cap as a substitute for a hard hat when protection from falling objects is required.*

Hearing Protection – Use a hearing protection device such as earplugs or earmuffs when working with or near power tools that emit loud noise. The hearing protection device must have a noise reduction rating of 20 dB or more. The noise reduction rating should be clearly marked on the product packaging or on the item itself.

Leather Gloves – Wear leather gloves when focusing hot instruments or when handling heavy equipment or scenery. *Never wear leather gloves when operating power tools; a spinning blade or bit can catch them.*

Safety Glasses – Wear safety glasses or goggles when sawing, drilling, or sanding any solid material. Do not use face shields as a substitute for safety glasses as they do not provide adequate protection. Avoid sharing safety glasses and goggles. If sharing is necessary, thoroughly wash the safety glasses or goggles with hot water and soap to prevent the transfer of infections.

Shoes – Wear sturdy close-toed shoes at all times when working in a theater. Sandals and flip-flops will not provide the protection needed. Tennis shoes and running shoes may not provide the protection needed. High top work shoes equipped with steel toe guards are recommended for working with scenery

POWERED PERSONNEL LIFTS

Powered personnel lifts are machines that use electrically powered hydraulic pumps to vertically raise a platform that the lift operator stands on. When used properly, lifts are the safest way to reach battens and lighting equipment over the stage. These machines require the full attention of all personnel involved in their use.

The following are specifications and guidelines for using powered personnel lifts.

SPECIFICATIONS FOR PERSONNEL LIFTS

ANSI/SIA Standard – Lifts acquired, either by purchase or donation must meet standard number ANSI/SIA A 92.3-1990 of the American National Standards Institute/Scaffold Industry Association, Inc.

Approval – The Office of Facilities Services (571-252-2960) must approve all purchases or potential donations.

Electrical Shock Prevention – Lifts used for the purpose of adjusting stage lights must have a fiberglass (insulated) work platform.

Training – All persons using a powered lift must have received training from a qualified instructor approved by the LCPS Office of Facilities Services and must have passed a user's knowledge test. Upon successful completion of training and the test, an operator's certificate will be issued.

Types of Lifts – The only type of lift permitted for stage use is a manually propelled, single-person lift. *Power-driven scissor lifts, boom lifts, and battery-powered lifts are not permitted.*

GUIDELINES FOR THE USE OF POWERED PERSONNEL LIFTS

Capacity – Do not exceed the rated capacity of a lift.

Cleanliness – Keep lifts clean and free from all foreign material, including paint, mud, snow, oil, and other such substances.

Discontinue Use – Do not use any lift that does not successfully pass the inspection described above until corrections made. *Immediately withdraw from service all lifts that have developed mechanical defects, and clearly tag or mark: "DANGEROUS, DO NOT USE." Notify a school administrator.*

Ground Spotter – Use a person who is knowledgeable about all emergency controls to act as a ground spotter when the lift is in use. Ensure that the ground spotter gives full time and attention to warning the lift operator of any potential hazards and to warning all persons on the ground as to the presence of the lift and operator. The spotter must wear a hard hat.

Inspection – Inspect lifts prior to each day’s use to ensure that all components are in good working order. Ensure that all of the following checks are made:

1. *Controls* – Test all operating and emergency controls for proper function. All emergency stops and releases must function as designed.
2. *Debris* – Clear the lift platform of loose hardware, tools, and debris.
3. *Electrical Connections* – Inspect the electrical cord and plug to ensure that they are in good working condition, with proper strain relief and no damage to the insulation or conductors.
4. *Guardrails* – Determine that all guardrails are in place and any moveable rails are able to return freely to the operating position.
5. *Hardware* – Check to see that all mounting bolts and other hardware are in place and properly secured.
6. *Outriggers* – Ensure that all outriggers are able to lock in place and all leveling devices function properly.

Level Surface – Use the outriggers to level the lift when used on a sloped surface such as an auditorium aisle. The lift must be level prior to raising the platform.

Moving a Lift – Never attempt to move a lift in a raised position.

Repairs – Make no repairs to a lift except as authorized by the manufacturer. Unauthorized repairs or modifications may void manufacturers’ warranties.

Overhead Hazards – Identify potential overhead hazards such as work lights, conduits, duct work, curtain tracks, and lighting battens.

Outriggers – Use all outriggers and stabilizers as required by the manufacturer. Never attempt to use a lift without proper deployment of outriggers.

Protection of Personnel – Technicians on the lift must wear a bump hat. The ground spotter must wear a hard hat. Do not allow anyone other than the ground spotter to be present near a lift when it is in use.

Securing Tools – Secure tools and other objects against falling while work is being performed from a lift. Use tie lines to attach tools to the body when possible. Do not drop or throw items from raised lift platform.

Security – Secure lifts when not in use to prevent unauthorized access and use.

Training – All persons using powered personnel lifts must be trained and certified by the Office of Facilities Services.

Unstable Surfaces – Do not position lifts on orchestra risers, scenery platforms, or other light-duty surfaces.

Work Area – Inspect the workplace prior to using a lift. Remove any loose debris that may hinder movement of the lift.

SCAFFOLDS

Scaffolds are safer and easier to use than ladders. When using scaffolds, one must follow many of the guidelines for **ladders**, in addition to some that are unique to scaffolds.

The following are the guidelines for the use and care of scaffolds:

Cleanliness – Keep scaffolds clean and free of all foreign material, including wet paint, mud, snow, grease, oil, or other such substances.

Cross Braces – See that scaffolds are properly supported with cross braces. Braces must be of a length that will automatically square and align vertical members so the erect scaffold is always plumb, square, and rigid.

Damaged Scaffolds – Do not use scaffolds with faulty, damaged, broken, or missing parts. Make no repairs to scaffolds except as authorized by the manufacturer. *Immediately withdraw from service scaffolds that have developed defects, and tag or mark “DANGEROUS, DO NOT USE.” Notify a school administrator.*

Guardrails – For all work levels ten feet high or higher, install a guardrail that is at least 36 inches high but no higher than 42 inches.

Inspection – Maintain scaffolds in good condition at all times. Prior to each day’s use, inspect them to ensure that the joints between individual components are tight and that all hardware and fittings are securely attached.

Ladders – Provide a climbing ladder or stairway for proper access and egress, and make sure it is affixed or built into the scaffold in such a way that its use will not have a tendency to tip the scaffold.

Maximum Height – Make sure that the maximum height of the top platform does not exceed four times the dimension of the narrowest side of the base. Suitable outriggers may be used to achieve the proper base width.

Minimum Width – Make sure the platform is at least 20 inches wide.

Platforms – Ensure that the work-level platform of a scaffold is the full width of the scaffold, except for necessary openings. Secure work platforms in place.

Repairs – Do not make repairs to damaged scaffolds. Report a damaged scaffold to the Office of Facilities Services (571-252-2960).

Securing Tools – Secure tools and other objects against falling while work is being performed from a scaffold or lift. Use tie lines to attach tools to the body when possible. Never leave tools and equipment on a scaffold. Do not drop items from a scaffold or throw to another worker.

Storage – Store scaffolds properly indoors making sure that nothing is stacked against or on top of them and that they are protected from physical damage.

Toe boards – Provide a standard toe board for all work levels ten feet high or higher.

Unstable Surfaces – Do not use scaffolds on boxes, orchestra risers, or other unstable bases to obtain additional height.

Use of Scaffolds Near Doors – Do not use scaffolds in front of a door opening toward the user unless the door is blocked open or guarded.

Wheel Locks – Ensure that all scaffold casters are equipped with positive wheel locks and/or swivel locks to prevent movement. Lock casters prior to climbing, and do not move scaffolds or lifts while occupied.

Work Area – Use scaffolds only on a flat, firm base, and keep the surrounding area clean.

SCENERY

Scenery design and construction must balance artistic interpretation with safe construction practices. The purpose of these specifications and guidelines is to establish practical safety standards without detracting from the artistic design.

Following are the guidelines for the design and production of scenery.

GENERAL GUIDELINES

1. **Design Hazards** – The design and use of scenery must not pose any health or safety risks to audience, actors, or technicians.
2. **Fire Prevention** – All scenic elements described in these guidelines (such as flats, platforms, stairs, ramps, and trap doors) will be considered “decorative material” as covered by Section F-1701.0 of the BOCA Fire Prevention Code.
3. **Materials Hazards** – Materials for construction of scenery that would pose a toxic risk to people or the environment must not be used.
4. **Visibility** – Whenever possible, avoid having performers move about in the dark. This is often impossible, and at such times glow tape should be used to mark the on-stage edges of hazards. Small, low wattage lamps should be used to illuminate off-stage platform edges and stairs

GUIDELINES FOR SPECIFIC KINDS OF SCENERY

FLATS

Bracing – Brace all flats so that they cannot fall and cause injury or come in contact with hot stage lighting instruments.

Construction – Align the wood grain of corner blocks and keystones so that they run perpendicular to the joint of the 1 x 3 frame.

Covering – Use flame-retardant muslin over the surface of a hard cover or a hard wall flat if it needs to have a smooth, grain-free surface for painting. The fabric used must come with a manufacturer’s certification that it is flame retardant. *The application of post-manufacture flame retardant chemicals is not sufficient protection against fire.*

Flats Mounted on Battens – Do not exceed the weight capacity of the batten, which is usually 1500 pounds or 500 pounds at any one spot. Flat borders must be securely mounted at the top and bottom of the flat to prevent falling. No batten should deflect more than 1/360th degree of the

span between supports. Mounting borders on Roto-drapers is prohibited without approval from the Office of Facilities Services (57-252-2960).

Glass – *Never use glass windows for stage scenery.* The effect of glass can be created using heat shrink window insulating plastic, Plexiglas, or aluminum window screen.

Hanging Flats – To hang flats from battens, do not exceed the weight capacity of the batten, which is usually 1500 lbs. overall and 500 lbs. at any one spot. Borders must be of lightweight construction and must be securely mounted at the top and bottom of the flat to prevent falling. Any batten should not deflect more than 1/360th of the span between supports. *Mounting borders to Roto-Drapers is prohibited without approval from the Office of Risk Management (571) 252-1280*

Hard-Cover Flats – Use Masonite, Upson board, or Luan plywood to make hardcover flats. The framing should be the same as for muslin flats, but no corner blocks or keystones are required.

Hard-Wall Flats – Hard wall flats should be used if a more stable scenery wall is required. Hard wall flats have a 1 x 3 frame assembled on edge, not flat like those for muslin or hardcover flats. Corner blocks and keystones are not required, and the covering is the same as those for hardcover flats.

Materials – Use flame-retardant scenery muslin (FR), and 1 x 3' framing for traditional scenery flats. Make corner blocks and keystones to join the flat frame from ¼" AC-grade plywood.

Plastics – Use rigid cellular plastics, such as polystyrene blue board, for scenery construction. Use a flame-resistant paint, if necessary.

Size – Design scenery flats (vertical surfaces) so that they can be easily handled. Flats wider than 6 feet or taller than 12 feet are difficult to move and store. Reusable stock scenery flats with standardized dimensions (such as 4 feet wide and 8 to 12 feet high) work well to create large wall surfaces, yet are not difficult to store.

PLATFORMS

Cross Braces – Attach 1" x 3" wood cross braces to the legs of any platform over 2' in height. Cross braces should form an "X" pattern on the sides and ends of the platform. The braces should be attached within 9" of the bottom of the leg.

Fall Protection

1. *Design* – Incorporate sufficient area into the design of a raised platform. Performing on a platform that is too small may endanger actors.
2. *Off-Stage Railings* – Provide railing for all off-stage exposed edges of a raised platform with the railing not less than 36 inches or greater than 42 inches in height. The railing must be strong enough to stop a person who has stumbled or inadvertently walked into it.

Vertical and horizontal pieces of the railing must be made from 2' x 4' or stronger material. Vertical supports must be bolted or attached to the platform with three 3" screws with a maximum spacing of 48 inches. A rough design of protective railings must be submitted to the Office of Safety and Security for approval.

3. *On-Stage Railings* – Whenever possible, provide railing for the on-stage exposed edges of platforms. If railing is inappropriate to the design of the scenery (such as a rock cliff), mark the top surface of all exposed edges with paint or tape of a contrasting color to the scenery.

Height – Platforms higher than 10 feet must have their design approved by the Office of Safety and Security (571-252-1740) before construction begins.

Materials

1. *Frame* – Stud grade 2" x 4"
2. *Frame Attachment* – 3" wood screws or galvanized deck screws. Drywall screws should be used cautiously, since their resistance to shear force is not as great. *NAILS SHOULD NEVER BE USED TO JOIN PARTS OF A PLATFORM.* They do not provide sufficient stress resistance.
3. *Legs* – Stud grade 2" x 4".
4. *Leg Attachment* – Two-3/8" x 3 1/2" hex head carriage bolts for each leg.
5. *Platform-to-Platform Attachment* – Two to four 3/8" x 3 1/2" hex head carriage bolts (depending on length of contact surface).
6. *Top Surface* – 3/4 -inch-thick CDX grade plywood or better. .
7. *Top Surface Attachment* – 2" drywall or wood screws spaced at 8" intervals.

Required Number of Legs – Provide six legs for a standard 4' x 8' foot platform. If more than one standard platform is used to create a single height surface, adjacent platforms that are properly bolted together may share support legs.

Sizes – A basic unit measures 4' x 8'. Sizes of other stock units that may be useful include 2 feet x 8 feet, 4 feet x 4 feet, and a triangle with one side that is 4' x 4' and two sides that are 4' x 8' each.

Standard Platforms – Use standardized platform units whenever a raised walk surface is required for stage scenery. A reusable standard platform is a basic building block for creating larger, more complex surfaces. All non-standardized platforms higher than 3 feet must be constructed in compliance with industry standards.

RAMPS

Maximum Slope – Avoid designing ramps with slopes greater than 1:4. (For every 4 inches of horizontal travel, the ramp should rise no more than 1 inch.)

Slip Prevention – If it is necessary to have a ramp with a slope greater than 1:4, provide a nonskid surface such as sand-textured paint or a commercially available adhesive-backed nonskid surface.

Notification and Inspection – *Notify the Office of Risk Management at (571) 252-1280 if a trap door is planned for a show. The design must be reviewed and approved prior to construction and inspected before the first rehearsal use.*

STAGE EXTENSIONS

Designs for stage extensions must be submitted to the Office of Facilities Services (571-252-2960) for approval before construction begins. The distance between the forward edge of the extension and the first row of seats must not be less than the width of the nearest exit doors.

STAIRS

Risers – Construct stair units with risers of equal height. The riser height for acceptable stage use is between 5” and 9 ½”.

Treads – Construct stair treads with a minimum depth of 8”. Treads must be made from ¾” plywood, 2’ x 12’ boards, or 5/4” stair treads.

Handrails – Provide handrails for all off-stage stairs and, whenever possible, for all on-stage stairs. Handrails must be constructed and mounted in the same way as those for platforms (see **PLATFORMS > Fall Protection**). Ships ladder type stair units are acceptable for use both on stage and off, but they must have a handrail on both sides of the stairs.

Cross Bracing – Provide substantial cross bracing and support for stairs. Stairs receive more physical abuse than platforms because of the repeated shock load of the body weight of actors climbing and descending the stops.

TRAP DOORS

Design – Use extreme caution when designing trap doors for stage sets. The trap door must have the same load-bearing capability as the rest of the platform surface. All edges of the trap door, and the hole in the platform, must be framed with 2 x 4 lumber. Hinges must be heavy-duty and closely spaced. The latch mechanism can best be accomplished using a section of 1” (inside diameter) schedule 40 steep pipe. The pipe is slipped through holes drilled into the platform and trap door frames. Any trap door that will be used as part of a platform on which persons will walk must have its design approved by a civil engineer from the LCPS Department of Construction prior to construction, and it must be inspected by the same before the first rehearsal use.

SET STRIKES

Fire Prevention – Carefully stack and organize lumber and other scenery materials; a loose pile of boards provides greater exposure to the risk of fire. Disorganized materials are too difficult for most people to access. A reasonable amount of lumber may be stored. Avoid excessive amounts of flammable materials.

Organization – Carefully organize set strikes. All participants should be protected from accidents caused by haste. Teams of people with specific responsibilities should be established.

Personal Protection – Ensure that all those participating in a set strike have proper clothing and that they pay particular attention to hand and foot protection.

Removal of Hardware – Remove all nails, screws, and any other hardware from lumber before it is stored. This is a task that is often ignored because of time constraints, but carelessness in this area has become a major cause of injuries.

Scheduling – Schedule set strikes (dismantling) as soon after the final performance as possible. Strikes should be completed within 72 hours.

Scrap Lumber – Do not salvage lumber shorter than 12 inches in length. Such scraps are rarely used again.

Stage Floor – Carefully check the stage floor after a set strike to ensure that all protruding hardware, such as nails and staples, have been removed. Pushing a snow shovel or a piece of plywood across the stage is a good way of finding any remaining hardware.

Storage – Establish well-defined areas for scenery storage. Emphasis should be placed on good housekeeping to prevent injury caused by tripping over scenery or by being hit by dislodged set pieces.

TOOLS

Accidents involving tools are among the most common causes of injuries in theaters. The single most important factor in achieving safety is the user.

Following are the guidelines for working with tools:

AUTHORIZED AND UNAUTHORIZED POWER TOOLS

The only power tools that are approved for student use are drills, power screw drivers, screw guns, saber saws, reciprocating blade saws, miter saws (Sawzall), powered sanders, hot knife, hand drills, and drill press.

Hand-held circular saws, radial arm saws, routers, band saws, and panel or table saws are prohibited for student use.

TRAINING AND CERTIFICATION

Students who work with a hand drill, drill press, miter saw, saber saw, reciprocating blade saw, or screw gun must be trained and certified to use each tool. (See Appendices B-G). A parental permission form (Appendix A) must also be on file before a student may use any of these tools.

GUIDELINES FOR WORKING WITH TOOLS

Attentiveness – Stay alert at all times when working with tools, particularly powered ones. Many skilled workers have been injured because of simple mistakes that could have been easily prevented.

Battery Powered Tools – Since battery-operated tools pose a special hazard in that they are always energized, remove the battery if possible prior to making any adjustments.

Clothing – Be aware that proper attire is extremely important when working with tools. Remove loose jewelry and secure loose clothing to prevent entanglement with moving parts. Tie back long hair because it can be easily drawn into air vents of power tools. Do not wear gloves when working with power tools, as a blade or bit can catch gloves; gloves offer good protection, however, from pinches and blows from hand tools. See also the section on **Personal Protection/Proper Apparel**.

Disconnect Power Supply – Disconnect a power tool when not in use and prior to making any adjustment

Dust Mask – An inexpensive, disposable facemask that covers the nose and mouth. It protects the mouth and nose from dust and particles generated by the use of power tools. *Technicians*

must wear OSHA-approved dust masks when working with power tools. Do not share dust masks, as they can spread infection and disease.

Electrical Cords – Do not abuse a tool’s electrical cord. Never lower the tool to the floor by its cord.

Extension Cords – Whenever possible, plug power tools directly into an outlet, not through an extension cord. If an extension cord is necessary, make sure that the size of the wire is equal to or greater than the tool’s cord and that the cord bears the “UL” label (Underwriters Laboratory listed). *Never use an ungrounded two-wire extension cord.*

Hot Glue Guns – Use extreme caution when using hot glue guns. In addition to direct contact burns from the glue gun, injuries can occur when the glue drips on students working with or near the glue gun. *Hot glue guns are permitted for use by students in high school only (not in middle or elementary schools).*

Inspection – Prior to using a tool, check for missing or damaged parts. Make sure all guards work properly. If a tool is dropped while work is in progress, recheck prior to continuing. If a tool is damaged, do not use it. *Immediately withdraw it from service and clearly tag or mark: “DANGEROUS, DO NOT USE.” Notify the drama teacher.*

Maintenance – Maintain tools properly. Keep them clean to prevent loss of grip. Keep air vents free of sawdust and chips to prevent overheating. Keep bits and blades sharp so that tools are not overworked.

Manufacturer’s Instructions – Understand the safe operation of any tool prior to using it. Read and follow the manufacturer’s instructions completely.

Notification of Damaged Tools – If a tool is found to be mechanically or electrically defective, tag the tool “Dangerous, Do Not Use” and remove it from service. A teacher or administrator must be alerted to the problem.

Parental Permission – A student using power tools must have a signed parental permission form on file at the school. (See Appendix A.)

Proper Adjustment – Make sure that all bits, belts, and blades are tightly clamped. The speed at which power tools operate can cause parts to be thrown a considerable distance and at a high velocity.

Proper Balance – Do not overreach when working with tools. Maintain proper footing at all times.

Removal of Adjusting Keys and Wrenches – Remove all adjusting keys and wrenches prior to starting a tool.

Safety Glasses – Always wear safety glasses or goggles when working with power tools.

Securing Work – Secure work with a vise or clamps whenever possible, so that both hands are free to control the tool.

Selection of Tools – Select the proper tools for the job. Never use a tool for anything but its intended use. Inexpensive hand tools often chip easily and break under stress. Do not use an undersized power tool to do heavy-duty work.

Skills Test – A student must achieve a perfect score on a written and practical skills test for each power tool he or she intends to use. Each theatre teacher should create his/her own skills test reflecting the specific tools used in his/her program.

Storage – Store tools in their proper places when through working with them. Remove bits and blades and carefully coil power cords to prevent damage. Make sure tools are clean prior to storage. The drama storage room must be properly secured at all times.

Supervision – An adult supervisor must be present when students are working with power tools.

Work Speed – Do not force tools. They will do the job better and safer at the rate for which they were designed.

WINCH BATTENS

Battens that can be lowered or raised by mean of winches can be great time savers, and the hanging of lighting equipment is easily accomplished in a safe manner when the technician can stand on the floor and not have to use a ladder. Winches exert great force to lift the extremely heavy loads placed on battens. The safe operation of winches demands a thorough knowledge of and respect for the physical factors involved. *No pulley devices may be used to raise or lower objects on stage.*

Following are the guidelines and rules for the safe operation of winches:

GUIDELINES AND RULES FOR THE USE OF WINCH BATTENS

Alterations – *No alterations or adjustments to the permanently installed components of a winch batten may be made.* Requests for changes must be submitted to the building administrator. The building administrator must request repairs from the Office of Maintenance Services, Department of Facilities Services

Fouled Battens – Watch the travel of the batten and wire-rope lift lines. Stop if the battens should change angle or if one or more of the lift lines are observed going slack.

Identify the Proper Batten Winch – Before moving (or flying) a batten, carefully identify the batten needed and locate the proper winch.

Load Capacity – Do not exceed the posted load limit for any batten. If load limits are not posted, check with the building administrator before proceeding.

Obstructions – Check for possible obstructions that may foul the moving batten, such as microphone cables, curtains, scenery, lighting instruments, and lighting cables.

Operating the Winch – Keep a hand on the winch handle at all times.

Protection of Personnel – When a batten is being flown, ensure silence on stage, and warn other personnel. Do not allow anyone to walk or stand beneath a batten being raised or lowered.

Runaways – In the event of a runaway batten, shout “Heads” as a warning and immediately clear all personnel away from the path of the batten, lift lines, and winch. When there has been an incident of a runaway batten, shut down operation immediately and notify a school administrator.

Security – Winches must be securely locked when not in use.

Supervision – *An adult supervisor must be on stage when any batten is being raised or lowered.*

Spotters – Use at least one other technician as a spotter to watch the moving batten. If possible, use two spotters, one on each side of the stage.

Training– The Office of Facilities Services must train all winch operators.

Unusual Sounds – Listen for unusual sounds from the winch system or warnings from the spotter(s).



Loudoun County Public Schools

Department of Curriculum & Instruction

English/Language Arts

21000 Education Court

Ashburn, Virginia 20148

Telephone: 571-252-1330

FAX: 571-252-1802

PARENTAL PERMISSION FORM THEATRICAL AUDIO, LIGHTING, AND SCENERY TECHNICIAN

I hereby grant permission for my daughter/son to receive training and perform related work as a student theatrical technician. I understand that my child may not perform any work until after the appropriate training has been completed and that some of the activities of a theater technician may expose him/her to the risk of injury. I understand that participation in this activity is completely voluntary and that he/she may withdraw at any time.

I have reviewed the Loudoun County Public Schools publication **THEATER SAFETY – A Guide for Administrators, Teachers, Students, Parents, and Community Users** and understand that all activities will comply with the guidelines. Sections of **THEATER SAFETY** that will be most relevant to the activities of a technician are Audio, Catwalks, Curtains, Fire Safety, Ladders, Lifts, Lighting, Paints and Chemicals, Personal Protection, Scaffolds, Scenery, Tools, and Winch Battens.

I understand that my child will receive training in the use of any of the following equipment that he/she will be expected to use, depending on the availability of the equipment at the school: ladders, scaffolds, powered personnel lifts, cordless power hand drills, miter saws, saber saws, reciprocating blade saws, and screw guns.. The guidelines of the appropriate sections of **THEATER SAFETY** will apply at all times.

Student's Name: _____

I certify that I am the parent/legal guardian of the above named student.

Signature

Print

Date

PARENTS: If you have questions concerning this form or any of its contents, you may call

_____ at _____.
Drama Teacher (school phone #)

Rules for Use of Power/Cordless Hand Drill

Rules for use:

- Always wear safety glasses, hearing protection, and an OSHA-approved dust mask.
- Do not operate while wearing jewelry, loose long sleeves, gloves, or loose long hair.
- Always keep hands well clear of the bit.
- Keep your eyes on the drill until the bit has stopped spinning.

Procedures for use:

- Select the proper drill bit. The teacher will show you where the bits are located.
- Ask the teacher for a demonstration of how to remove/replace the drill bit.
- Insert the correct bit and make sure it is secure.
- Clamp or brace your work securely in place.
- Check under the wood to make sure you have clearance for the bit.
- Check the bit. If it is chipped or worn, secure a new one. Make sure the arrow on the collar is pointing toward the drill bit.
- Put the drill in forward gear.
- Place the drill onto your mark on the wood.
- Slowly squeeze the trigger. The drills are of variable speeds, so the more you pull the trigger, the faster they spin.
- When you get close to drilling all the way through the wood, back off a little on the downward pressure. This will ensure a cleaner hole on the other side of the wood.

Remember, if you don't feel comfortable doing something – DON'T DO IT!

The Power/Cordless Drill is not a toy. Treat it with respect.

Rules for Use of Miter Saw

Rules for use:

- Always wear safety glasses, hearing protection, and an OSHA-approved dust mask.
- Do not operate while wearing jewelry, loose long sleeves, gloves, or loose long hair.
- Always keep hands well clear of the blade.
- Never cut with any part of your body in the path of the saw.
- Keep your eyes on the blade until your hands are clear and the blade stops spinning.
- Use only when an adult is present.
- Never use without permission of the director.

Procedures for use:

- Set the correct angle by unlocking the rotating base and moving it to the correct degree and re-locking the base.
- Line up the blade with the measurement by bringing the stopped blade down to the mark and moving the wood until the blade and mark line up.
- Hold the piece you are cutting firmly with your hand.
- Make sure your hand is well clear of the blade.
- Check to make sure you are following all safety rules above.
- Start the saw.
- SLOWLY bring the saw blade down through the piece, making certain you are still on your mark.
- When you have cut through the piece, slowly guide the saw back up to its original position.
- Turn off the saw.
- DO NOT remove scrap from the blade area while the blade is moving.

Remember, if you don't feel comfortable doing something – DON'T DO IT!
The Miter Saw is not a toy. Treat it with respect.

Rules for Use of Saber Saw

Rules for use:

- Always wear safety glasses, hearing protection, and an OSHA-approved dust mask.
- Do not operate while wearing jewelry, loose long sleeves, glove, or loose long hair.
- Always keep hands well clear of the blade.
- Never cut with any part of your body in the path of the saw.
- Keep your eyes on the blade until the blade has stopped moving.

Procedures for use:

- Clamp or brace your work securely in place.
- Check under the wood to make sure you have clearance for the blade.
- Place the saw against the work, with the blade ½” from, and the plate securely on, the work.
- Hold the saw with one hand on the handle and one on the front of the saw and squeeze the trigger.
If you lock the trigger, keep your finger on the trigger.
- Most saber saws are variable speed, which means that the more you squeeze the trigger the faster the blade moves. For most applications, you should squeeze the trigger all the way.
- Move the saw slowly through the work, following the cut line. Do not force the saw; let it do the work. Keep the footplate resting flatly on the wood.
- As you move the saw forward, exert a slight downward pressure in addition to a forward motion.
- Stop frequently as sawdust covers your line. Blow the sawdust out of the way. When you start again, back the blade ½” from the end of the cut before pulling the trigger.
- As you approach the end of the cut, make sure your cutoff is supported. Do not cut through and let the cutoff piece fall.

Remember, if you don't feel comfortable doing something – DON'T DO IT!

The Saber Saw is not a toy. Treat it with respect.

Rules for Use of Screw Gun

Rules for use:

- Always wear safety glasses and hearing protection.
- Do not operate while wearing jewelry, loose long sleeves, gloves, or loose long hair.
- Always keep hands away from the screw and bit.
- Keep your eyes on your work at all times while in use.

Procedures for use:

- Check your bit. If it is chipped or worn, see the director for a new one. Make sure the arrow on the collar is pointing toward the drill bit.
- Put the drill in forward gear. There is a button on the handle that should be placed all the way to the left.
- Place a screw on the bit. It should fit snugly. If it does not, check the screw head for obstructions. Discard all screws that are damaged.
- Move your hand from the screw onto the back of the screw gun.
- Slowly squeeze the trigger. The guns are variable speed, so the more you pull the trigger, the faster they spin.
- Start slowly. Once the screw catches and starts going into the wood, speed up, and lean into the drill, using your body weight to help drive the screw into the wood.
- Sink the screw so that the head is slightly below the level of the wood.
- If you feel the drill bouncing in and out of the screw head, STOP IMMEDIATELY; continuing will strip the head and make it difficult to continue or to remove the screw. Set the gun in reverse by pushing the button on the handle all the way to the right, and slowly back the screw out ½" or so. Put the gun back into forward and begin again.

Remember, if you don't feel comfortable doing something – DON'T DO IT!

The Screw Gun is not a toy. Treat it with respect.

Rules for Use of Reciprocating Blade Saw (Sawzall)

Rules for use:

- Always wear safety glasses, hearing protection, and an OSHA-approved dust mask.
- Do not operate while wearing jewelry, loose long sleeves, gloves, or loose long hair.
- Always keep hands well clear of the blade.
- Never cut with any part of your body in the path of the saw.
- Keep your eyes on the blade until your hands are clear.
- Use only when an adult is present.
- Never use without permission from the director.

Procedures for use:

- Clamp or brace your work securely in place.
- Check behind the work to make sure you have clearance for the blade. Clear the area of people.
- Place the saw against the work, with the blade ½” from, and the plate securely on, the work.
- Hold the saw with one hand on the handle and one on the barrel and squeeze the trigger. If you lock the trigger, keep your finger on the trigger.
- Most Reciprocating Blade Saws (Sawzall) are variable speed, which means that the more you squeeze the trigger the faster the blade moves. For most applications, you should squeeze the trigger all the way.
- Move the saw slowly through the work. Do not force the saw; let it do the work.
- As you move the saw forward, exert a slight downward pressure in addition to a forward motion.
- Stop frequently as sawdust covers your line. Blow the sawdust out of the way. When you start again, back the blade ½” from the end of the cut before pulling the trigger.
- Take care at the end of the cut that the weight of the saw does not pull the saw down into the floor or onto a leg.

Remember, if you don't feel comfortable doing something – DON'T DO IT!

The Reciprocating Blade Saw (Sawzall) is not a toy. Treat it with respect.

Rules for Use of Drill Press

Rules for use:

- Always wear safety glasses, hearing protection, and an OSHA-approved dust mask.
- Do not operate while wearing jewelry, loose long sleeves, gloves, or loose long hair.
- Always keep hands well clear of the bit.
- Never do any work “free-hand,” i.e., holding the work piece rather than supporting it on the table.
- Never move the head or table support while the drill is running.
- Never climb on the drill press table; it could break or pull the entire drill press down on you.
- Do not perform layout, assembly, or set-up of work on the table while the drill is rotating.
- Use only when an adult is present.
- Never use without permission from the director.

Procedures for use:

- Place the drill press on a stable, flat table in a well-lit area.
- Support the piece you are working on so it won't shift or bind on the drill.
- Whenever possible, position the piece you are working on so as to contact the left side of the drill column.
- When using a drill press vise, always fasten it to the table.
- Before starting the operation, jog the motor switch to make sure the drill bit does not wobble or cause vibration.
- Use the spindle speed recommended for the specific operation and material you are working on.

Remember, if you don't feel comfortable doing something – DON'T DO IT!

The Drill Press is not a toy. Treat it with respect.

THEATER SAFETY

5-POINT WALK-THROUGH INSPECTION BEFORE OCCUPYING THE AUDITORIUM

School _____

Date _____ Time _____

Inspector _____

YES NO

- ___ ___ 1. **Exits** are accessible; signs are illuminated.
- ___ ___ 2. **Panic bars** for all doors function properly.
- ___ ___ 3. **Panic button** for houselights functions properly.
- ___ ___ 4. **Fire extinguishers** are accessible and in working order.
- ___ ___ 5. **Work lights** on stage function properly.

Comments:

THEATER SAFETY

**9-POINT WALK-THROUGH INSPECTION BEFORE
LEAVING THE AUDITORIUM**

School _____

Date _____ Time _____

Inspector _____

YES NO

- | | | |
|-----|-----|--|
| ___ | ___ | 1. Auditorium doors are properly secured. |
| ___ | ___ | 2. Control booth is properly secured. |
| ___ | ___ | 3. Access to catwalk is properly secured. |
| ___ | ___ | 4. Aisles are clear of obstructions and trip hazards. |
| ___ | ___ | 5. Stage equipment and tools are properly stored. |
| ___ | ___ | 6. Stage floor is free of any dangerous debris (nails, etc.). |
| ___ | ___ | 7. Dressing rooms are clean and orderly. |
| ___ | ___ | 8. Personnel lifts have been secured to prevent unauthorized use. |
| ___ | ___ | 9. The drama storage room is properly secured. |

Comments:

SAFETY CHECKLIST FOR THE DESIGNATED SAFETY MANAGER

School _____

Date _____

Inspector _____

CATWALK

- At least two, and no more than six, persons are on the catwalk at any one time.
- All technicians have **safety tie lines** attached to tools.
- All technicians are wearing **bump hats**.

LADDERS AND SCAFFOLDS

- A **spotter** is in place whenever someone is on a ladder or scaffold.
- The **spotter** is wearing a hard hat.
- All technicians have **safety tie lines** attached to tools.
- All technicians are wearing **bump hats**.

HAZARDOUS LIQUIDS

- Technicians are using hazardous liquids (e.g., spray paint) in a ventilated area or outside.

PERSONAL PROTECTION/PROPER APPAREL

- Technicians are wearing sturdy, closed-toe shoes.
- Technicians using power tools have removed loose jewelry and tied-back long hair.
- Technicians are not wearing gloves.
- Technicians handling lamps from lighting equipment are wearing **cotton gloves**.
- Technicians using power tools are wearing safety **goggles**.
- Spotters are wearing **hard hats**.
- Technicians operating loud power tools are using **ear plugs**.
- Technicians working near hazardous vapors are wearing OSHA-approved **dust masks**.

POWERED PERSONNEL LIFTS AND SCAFFOLDS

- Outriggers and stabilizers** required by the manufacturer are in use.
- The lift or scaffold is located on a sturdy, level surface.
- A **spotter** who is familiar with the emergency controls of the lift is being used.
- The spotter is wearing a **hard hat**.
- No one other than the spotter is near the lift when it is use.
- Scaffolds are not being used near doors opening toward the user unless the door is blocked open or guarded.
- Lift and scaffold **wheels** are securely locked.

- Scaffolds with work levels ten feet or higher have **toe boards** installed and have **guardrails** that are between 36 and 42 inches high.

POWER TOOLS

- All technicians using power tools have been trained in their use.
- Extension cord wires** are equal to or greater in length than the power tool cord.
- Extension cords** have 3-prong plugs.

WINCH BATTENS

- An adult is on stage when any batten is raised or lowered.
- Winches are securely locked when not in use.
- A **spotter** is in place when battens are raised or lowered.
- No one is standing beneath a batten that is being raised or lowered.
- Before a batten is raised or lowered, all personnel are warned and there is silence on stage.
- Technicians operating a winch should keep a hand on the winch at all times.
- Winch operators and spotters are wearing **hard hats**.

DOOR WARNINGS

- During productions, the following warnings, when appropriate, are to be posted on entrance doors and printed in the program:

STROBE EFFECTS

“Warning: This production includes a STROBOSCOPIC LIGHT EFFECT that might prove disturbing or otherwise harmful to persons suffering from epilepsy.”

FOG EFFECTS

“Warning: This production includes an AEROSOL SIMULATED FOG EFFECT. This fog is intended for public performances, but persons who are asthmatic or who are allergic to dust should identify themselves to house personnel so they might be seated where there is least possibility for discomfort.”

LOUD GUNSHOTS

“Warning: This production includes one or more LOUD GUNSHOTS. It may be disturbing or harmful to some persons with an emotional disturbance or abnormal heart condition.”

VERY LOUD MUSIC OR NOISE

“Warning: This production includes VERY LOUD MUSIC OR NOISE. It may be disturbing or harmful to some persons.”

LASER

“Warning: LASERS are being used in this area. The equipment makes it possible under certain conditions to produce a STROBOSCOPIC LIGHT EFFECT that might prove disturbing or harmful to persons suffering from epilepsy.”

ACKNOWLEDGEMENT OF RESPONSIBILTIY BY COMMUNITY USER

This form is to be completed and signed by the director of any community group using a Loudoun County Public Schools school theater. It is to be filed with the school’s principal or her designee prior to the group’s occupation of the theater.

SCHOOL BUILDING _____

NAME OF GROUP _____

DIRECTOR _____

I have read the Loudoun County Public Schools Theater Safety Manual and acknowledge that I am responsible for its implementation during our production. I understand that failure to adhere to these safety guidelines may result in our group being denied use of this facility in the future.

Director’s signature

Date

GLOSSARY

A-FRAME LADDER – A freestanding ladder that consists of two sections, hinged together at the top. Both sections have rungs for climbing.

ADJUSTING KEYS and **WRENCHES** – Any tools or devices used to tighten or release the locking mechanism of the chuck that holds the bit (or blade) of the tool.

AMPACITY – The current handling capacity of an electrical device, measured in amperes (amps).

ARC or **ELECTRIC ARC** - Luminous discharge of current that is formed when a strong current jumps a gap in a circuit or between two electrodes. When an arc occurs, it expends much of its energy, leaving behind a crusty charred residue that can render an instrument useless.

BARN DOOR – A device for shaping the light emitted from a Fresnel. It consists of two or four metal flippers and is attached to the Fresnel by inserting it in the color frame holder.

BATTEN – A steel pipe, usually measuring 1½” (inside diameter), suspended above a stage; used for mounting lighting instruments or curtains.

BOCA – Acronym for Building Officials and Code Administrators International, Inc. This organization writes and publishes the building and fire prevention codes that have been adopted as the uniform code for all counties in Virginia.

BORDERS – (1) Valance curtains that are hung above the stage and serve to mask the overhead equipment from the audience’s view. They are usually made from black fabric; also called teaser curtains. (2) Temporary scenery constructed from flats or unframed painted fabric that serve the same purpose as definition (1) above, but also function as visual extensions of the stage set.

C-CLAMP – A malleable iron clamp shaped like the letter “C” that is used to bolt lighting instruments to battens. C-clamps must be operational and free from cracks.

CASEIN PAINT – Scenery paint that has casein (a chemical derived from sour milk) as a binder. This type of paint is sold as a thick concentrated paste and must be diluted with water prior to use. (Also called protein-based paint.)

CATWALK – The lighting area that is located in the ceiling above the audience seating area. Catwalks include a walking surface, instrument mounting positions, and electrical circuits.

COLOR FRAME – A device for holding the color medium in place on lighting instruments, generally made of lightweight sheet metal.

CONDUCTOR – The metal part of an electrical cord or wire that carries the electrical current.

CONDUIT – Permanently installed metal pipe used to house and protect electrical wiring.

CORNER BLOCK – A 45-degree right triangle made from ¼-inch AC-grade plywood. A corner block is fastened to each corner of a 1 x 3 wood-framed muslin scenery flat to strengthen the joint and to maintain a square corner.

CROSS BRACES – Structural members of a scaffold that are mounted at an angle to the horizontal and vertical sections. A cross brace consists of a single tube for aluminum or fiberglass scaffolds, or an adjustable “X” shape of angle iron for steel scaffolds.

CYC-LIGHT – A lighting instrument that is designed for lighting a cyclorama or backdrop and is hung above the stage. A single instrument has from one to four lamps, each with a separate plug. (Also called FAR-CYC, SKY-CYC, or IRIS, all trade names.)

CYCLORAMA (also called Cyps) – These curtains cover the width of the stage and are usually hung furthest upstage (away from the audience). They are most often off-white in color, although some may be sky blue. They are sewn flat with no pleats and are used as a surface to project washes of colored lights.

DIMMER – A device that regulates the voltage supplied to lighting circuit outlets. Dimmers are controlled by electronic signals from the control panel.

DIMMER MODULE – A component of the stage lighting control system. A module will contain anywhere from one to four dimmers, each protected by an individual circuit breaker.

DIMMER RACK – The metal cabinet that contains the individual dimmer modules. The rack has power line cables that energize the dimmers and circuit load wires that energize the lighting receptacles. The rack typically will have cooling fans and grills and a metal protective door.

DIRECTOR – The adult directly responsible for the entire production, or her designee.

DUCT TAPE – Adhesive tape with bright metallic silver finish intended to seal air ducts.
AVOID USE OF DUCT TAPE ON STAGE OR IN ANY THEATRICAL SETTING.

DUCTWORK – Elongated sheet metal tube or box structure used to transport air from the heating or air conditioning source. Ducts are often wrapped with fiberglass insulation.

DUST MASK – An inexpensive disposable facemask that covers the nose and mouth. This type of mask provides protection from sawdust and other large particles only and will not protect the user from paint fumes. Only OSHA-approved dust masks should be used.

ELLIPSOIDAL – A lighting instrument designed to produce a hard-edged beam of light. Ellipsoidals are used on catwalks, or on box booms, or above the stage. An ellipsoidal has an adjustable lens barrel to focus the beam and four steel shutters to shape the beam. Ellipsoidals are classified by the diameter of their lenses or the focal length or the beam spread (e.g., 6” x 9” ,

6" x 50 degrees). (Also called an ERS, which stands for Ellipsoidal Reflector Spotlight, or a LEKO, which is a trade name.)

EXIT ACCESS WAYS – Areas of the auditorium that are free of fixed seating. Exit access ways include vestibules, the areas behind the last row of seats, and the area between the first row of seats and the stage.

EXTENSION LADDERS – A ladder that consists of two straight single ladders that are attached to each other by their side rails. The length of the ladder can be adjusted by sliding the two sections closer together or farther apart. (*Extension ladders may not be used in the theater program.*)

FLAME RETARDANT S– Chemicals used to render combustible materials resistant to flame but not necessarily fireproof. A fire retardant is usually sprayed on as a clear liquid or added to paint as a powder. *All fabrics, including curtains and costumes, must be labeled by the manufacturer as flame retardant. The post-manufacture application of flame retardants is not sufficient protection from fire.*

FLASHPOT – A device used to electrically ignite chemicals to produce a flash of light, an explosion, and/or smoke. *The use of flash pots is prohibited.*

FLATS – Large vertical surfaces of stage scenery often used to represent walls but made of lightweight materials such as thin plywood, fabric, or dense cardboard.

FOG MACHINE – A device that uses chemicals to produce a fog-like vapor for special effects. *Fog machines must be tested and approved by the Office of Safety and Security before they are turned-on.*

FRESNEL – A lighting instrument (generally hung above the stage) that produces a soft-edged beam of light. This instrument has an adjustable lamp socket and reflector assembly to focus the beam of light. A Fresnel is classified by the diameter of its lenses (e.g., 6" or 8").

GAFFERS TAPE – Heavy-duty adhesive tape for stage use. Usually supplied in two-inch-wide by 60-yard-long rolls, this tape has a durable base of woven fibers and is strong enough to hold stage cables to battens. Gaffer's tape comes in black and several other colors and is available through theatrical supply vendors.

GAUGE – The size or thickness of the conductors in an electrical cord. The lower the gauge number, the larger the conductor. The gauge number is printed on or embossed into the outer insulation of stage cables. Often the gauge number is followed by the amount of conductors in the cable. Example: 12/3 = 12 gauge conductor, three conductors.

GLOW TAPE – An adhesive tape that is luminescent. After exposure to a light source, this tape will appear as a green glow in the dark. Glow tape is available through theatrical supply vendors.

GRAND DRAPE – *See* MAIN ACT CURTAIN

GRAND TEASER – The border curtain that hangs above the main act curtain and is made from the same color and type of fabric as is the main act curtain.

HARD HAT – Protective head gear made of rigid material, with an inner suspension that spreads weight over the head's surface and separates the head from the inside surface of the hat.

HARDWALL FLATS – Scenery flats that have 1 x 3 lumber frames assembled on edge, not flat like those for muslin or hard cover flats. Corner blocks and keystones are not used, and the frame is covered with a hard surface sheet material such as Masonite, Upson board, or Luan plywood.

HOT PATCH – To plug a lighting instrument or circuit patch plug into an outlet that has been energized. This unsafe practice causes sparks and burned electrical contacts.

HYPOALLERGENIC – Having a low capacity to induce allergic reaction.

INSULATING SLEEVE – A hollow, flexible, woven fiberglass tube used as covering for protecting the wires that form a lighting instrument's electrical lead.

KEYSTONE – A trapezoid-shaped wood block made from ¼-inch plywood for the purpose of strengthening the joint between horizontal (toggle rail) and vertical (stile) framing scenery flat members.

LAMP – The light-producing component of a lighting instrument. The lamp consists of a metal base, a glass envelope, and a filament. While lamps are most commonly classified by wattage output, many other factors must be specified when ordering lamps. Using the three-letter ANSI (American National Standards Institute) standard code guarantees that a replacement lamp will match the original.

LAMP HOUSING – The part of the lighting instrument that contains the lamp and lamp socket.

LATEX PAINT – Water-soluble, latex rubber-based paint. This type of paint is the most commonly available household paint.

LUAN – A tight-grained plywood made from Philippine mahogany. Often used for manufacturing hollow-core interior doors and stage scenery.

LEGS (also called Tormentors) – Curtains that hang at each side of the stage that are usually made from black fabric and serve to mask the backstage wings from the audience's view.

LENS BARREL – The moveable part of an ellipsoidal lighting instrument that contains one or two lenses used to change the focus of the light.

LENS DOOR – The front access door of a Fresnel lighting instrument that holds the lens in place. This door is used to gain access to the reflector and lamp, and it has metal tabs to hold the color frame and/or the barn door assembly.

LIFT LINES – The wire ropes that attach to the batten. When wound on a winch, these lines lift the batten. Usually there are anywhere from three to seven lift lines for each batten.

LIGHT CENTER LENGTH (L.C.L.) – The distance from the tip of a lamp base to the middle of the filament.

LIGHTING INSTRUMENT – A complete lighting fixture including housing shell, lenses, reflector lamp, socket, electrical lead, plug, and mounting devices.

LOFT BLOCK – An individual pulley mounted to the ceiling over the stage. Each lift line of a batten passes over a loft block.

MAIN ACT CURTAIN – The traveler curtain that is hung closest to the audience. This curtain is usually made from a heavy velour fabric and often has a color different from the leg and border masking curtains.

MANUAL PULL STATION – A manually operated switch that activates a building's fire alarm system.

MASONITE – A dark brown sheet material made from wood fibers. Masonite (a trademark) is available in several thicknesses and is either tempered or un-tempered. Masonite is used in scenery construction as a covering for flats or as a veneer surface for stages or platforms. This material is not structurally sound and must not be used as a weight-bearing surface.

MIXER – A component of the audio system that allows a technician to adjust input signals from microphones, tape decks, and other sources and to channel the signal to various speakers and other outputs.

MUSLIN – A plainly woven cotton fabric used to cover scenery flats or to cover plywood to mask the grain of plywood. This material is available from scenery supply companies in a natural or flame-resistant (FR) form.

OFFSTAGE (also called backstage or wings) – The areas of the stage that are not readily visible to the audience.

ONSTAGE – The part of the stage that is within the audience's view. This area is defined by the location of masking curtains, scenery, or acoustic shells.

OSHA – Occupational Safety and Health Administration, the federal agency that is responsible for establishing and enforcing safety and health standards for general industry. The Virginia Department of Labor and Industry is responsible for administering and enforcing occupational

safety and health activities as required by the Federal Occupational Safety and Health Act of 1970.

OUTRIGGERS – (1) Angled support braces on scaffolds and powered personnel lifts that connect the vertical members to the floor. The surface that contacts the floor has a nonskid pad, usually made of rubber. (2) Temporary scenery constructed from flats or unframed painted fabric that serves the same purpose as definition (1) above, but also functions as a visual extension of the stage set.

PANIC BAR – A horizontal bar on a fire-exit door that releases the latch mechanism when the bar is pushed or struck.

PANIC BUTTON – A light switch, usually a push-button, that turns on all of the house lights in case of an emergency. It is located just inside the main entrance of the auditorium.

PAR can – A lighting instrument that uses a PAR (parabolic aluminized reflector) lamp to produce a soft-edged beam of light. This instrument has no lenses and does not have any means of adjusting the beam of light. PAR cans are classified by the size of lamp that they use (e.g. PAR 38, PAR 56, PAR 64).

PATTERN HOLDER – A device for holding a steel pattern, or gobo, in place inside an ellipsoidal lamp.

PLATFORM LADDER – A stepladder that has a platform surface positioned above the highest safe step. This platform allows the worker to turn his or her body and to shift his or her feet to reduce fatigue. The top part of the ladder (where the two sections meet) serves as a safety rail.

PROTECTIVE WOOD CURB AND GUTTER – A device made of two strips of wood connected by a strip of plywood 3/8” thick or thicker. The air space between the two strips and below the plywood is used to house cables placed on the floor. The outside top edges of the two strips are beveled to reduce the possibility of tripping, and the entire device is secured to the stage with nails and/or gaffers tape.

RECIRCUITING – Re-plugging an instrument into an outlet of a different electrical circuit.

REPATCHING – Moving a lighting outlet patch cord (or slider) from one dimmer to another.

ROLLER DROP – A mechanical device used to roll a backdrop from the bottom up. A roller tube at the bottom of the backdrop is manually raised with rope and pulleys.

ROTO-DRAPER – A swivel device centered on a short length of pipe that a leg curtain is tied to. The roto-draper is attached to a track that allows the curtain to be turned at an angle and travel sideways.

S, SO, SOO, SE, SEO, ST, STO, STOO, SJ – Designation codes for the type of external insulating covering of flexible electrical cords.

SAFETY TIE LINES – A general term used for any type of lightweight rope or cord employed to connect a tool to the technician's body. The tie line serves as a means of catching a tool that is accidentally dropped by a person working above floor level.

SCOOP – A lighting instrument that produces a large flood of diffused light. The entire body of this instrument is a parabolic reflector, and it does not have any means of adjusting the beam of light. Scoops are hung above the stage and are often used for lighting painted backdrops or cycloramas. They are classified by body opening diameter (e.g., 10" or 16").

SCRIM – A curtain that is made from a seamless, open weave, black or white material. Scrimms are used to visually soften and blend the lighting on cycloramas and can also be used to dramatically reveal or hide an area of the stage, depending on how it is illuminated.

SHEAR FORCE – The stress resulting from pressure that causes two objects to slide relative to each other in a direction parallel to their plane of contact.

SHIP'S LADDER – Stairs that are set at an angle steep enough to require the use of handrails. Access to lighting catwalks is often gained by the use of a ship's ladder. A ship's ladder is one method of exiting the off-stage side of scenery platforms.

SHOCK LOAD – The abrupt application of weight to something.

SNOOT – A sheet metal tube that is affixed to the front of a Fresnel to narrow the field of light emitted from the instrument. Sometimes it is used on ellipsoidals, not to shape the emitted light, but to reduce glare that might be offensive to the audience. Also called a high hat or top hat.

SPREADER – A metal hinge device on a freestanding ladder that secures the two sections to each other at a fixed angle.

STEP LADDER – A freestanding ladder that consists of two sections, hinged together at the top. One section has steps; the other has braces only.

STRAIGHT SINGLE LADDER – A ladder that consists of a single section of two side rails connected by rungs. In order to use this type of ladder one must lean it against a wall or other structure.

STRIPLIGHT – A lighting instrument hung above the stage that consists of a row of sockets and reflectors. The sockets are wired in a repetitive series of either three or four circuits. No adjustments to the beam of light can be made, but provisions are made for the mounting of color media or colored glass roundels.

TEASERS – *See* **BORDERS**

TENSION FORCE – The stress resulting from pressure that causes two objects to pull apart in opposite directions.

THREE-PRONG GROUNDED PLUG – A plug for a three-wire extension cord that includes the hot, neutral, and ground conductors. The grounding wire and plug prong are designed not to carry any current when there is a malfunction of the equipment or electrical current comes in contact with the outer shell of the piece of equipment.

TOEBOARD – A barrier surrounding the work-surface-level of a platform or a scaffold that prevents materials or a technician's or actor's feet from sliding off the edge.

TORMENTOR – *See LEGS*

TOXIC RISK – The possibility of a person being poisoned by something.

TRAVELER CURTAIN – A curtain that is hung on wheeled carriers that travel on a track and is operated by a rope-and-pulley system or pulled by hand. These curtains include the main act curtain (also called the grand drape) and mid-stage and upstage dividing curtains.

TWO-WIRE EXTENSION CORD – An electrical extension cord that has only two conductors (hot and neutral) and does not have a protective ground wire. *Two-wire extension cords may not be used with power tools.*

UPSOM BOARD – Off-white, dense, pebbled-surfaced cardboard sheet material that is used to cover flats or used as a veneer surface covering only for stages or platforms. This material is not structurally sound and must not be used as a weight-bearing surface.

WATTAGE – The measure of power in an electrical devise.

WINCH – A steel spool with a crank handle that is mounted to the building's structure. It is used for pulling and winding the wire rope that is used to suspend a batten.

WIRE ROPE – The material used for lift lines on a flown batten. Also called aircraft cable.

YOKE BOLT – The bolt that attaches the yoke of the lighting instrument to the C-clamp. The vertical adjustment bolts of an instrument are also called yoke bolts because they attach the instrument to the yoke.

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