

Working at Heights in the Live Production Industry in BC



**A Guide to WCB
Requirements and
Safe Work Practices**



SHAPE
SAFETY & HEALTH IN ARTS
PRODUCTION & ENTERTAINMENT

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Safe Work Practices



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About SHAPE

SHAPE (Safety and Health in Arts Production and Entertainment) is an industry association dedicated to promoting health and safety in film and television production, theatre, dance, music, and other performing arts industries in British Columbia. SHAPE provides information, education, and other services that help make arts production and entertainment workplaces healthier and safer.

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About this document

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This guide is for employers and workers (including performers and technicians) in British Columbia's live performance industry. This guide explains WCB requirements and industry safe work practices for working at heights in the live performance industry. The requirements and safe work practices outlined in this guide apply not only to established performing arts organizations such as dance and theatre companies, but also to organizations that produce concerts, cooperative shows, corporate and special events (including festivals), and to volunteer and educational organizations.

These guidelines are intended to:

- help employers comply with their responsibility under the law to take every reasonable precaution to protect workers from falls
- educate everyone in the industry about fall protection issues, so they can produce creative work safely

This guide does not replace the Occupational Health and Safety Regulation or the *Workers Compensation Act*. This guide explains many of the workplace health and safety requirements that apply to live performance in B.C., but employers and workers should always refer to the Regulation for specific requirements that apply to their production activities.

In this guide the word *must* means that a particular safety step is required by the Regulation. The word *should* indicates that a particular action, although not specified in the Regulation, will improve safety in the workplace.

What's inside

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This guide is divided into three parts:

Part 1, Basic Health and Safety Information, includes information on responsibilities, health and safety coordinators, joint health and safety committees, and worker health and safety representatives.

Part 2, Getting Started, begins with three quick-start questions that will help you determine what fall protection your production needs. This part also includes information on types of fall protection, risk assessments, fall protection plans, and worker instruction and training.

Part 3, Safe Work Practices, describes general safety guidelines, the rehearsal process, safe development of production components, and safe work practices regarding unguarded edges, ladders, scaffolds, lifts, communication protocols, high steel, as well as performer flying and aerial stunts.

This guide also contains **Appendices**, including a glossary of terms, a list of core WCB requirements for working at heights, resources information, and sample rehearsal and safe development processes. The final appendix includes a risk assessment checklist, a fall protection plan form, and an information sheet for worker health and safety representatives.

Part 1:

Basic Health and Safety Information

Overview



- Responsibilities, page 4
- Health and safety coordinators, page 7
- Joint health and safety committees and worker health and safety representatives, page 8

Responsibilities

People who work in the performing arts often wear many hats and have several levels of responsibility, especially on small productions. This can make it difficult to figure out who is legally responsible for what. Individuals in the performing arts fall into four basic categories: owners, employers, supervisors, and workers.

Owners — If you own a performance venue or act on behalf of a venue owner, you are considered an owner.

Employers — If you pay anybody to work for you, you are considered an employer. Employers can include producers and contractors.

Supervisors — If you instruct or oversee anybody, you are considered a supervisor. Supervisors can include stage managers, crew chiefs, directors, choreographers, technical directors, stage carpenters, department heads, and production managers.

Workers — If you work under instruction, you are considered a worker. Workers can include performers, stage crew, technical crew, students, and apprentices. In some instances, volunteers are considered workers (see Section 106 of the *Workers Compensation Act*). In this guide, workers are generally referred to as *performers* and *technicians*.

Due diligence

Due diligence means taking all reasonable care to protect your own and others' well-being. When it comes to working at heights, you are responsible for doing everything a person in your position can reasonably be expected to do to prevent falls. As long as you exercise due diligence for your job and act in good faith (i.e., make reasonable decisions according to your background and knowledge), you will not be held responsible. For more information on due diligence, see the WCB pamphlet *Effective Health and Safety Programs: The Key to a Safe Workplace and Due Diligence*.



Note: This guide does not cover all the ramifications of liability issues, such as requirements for liability insurance to protect audiences and facilities. Seek legal information and advice on these issues.

Responsibilities under the *Workers Compensation Act*



In the Act: See Part 3, Division 3 – General Duties of Employers, Workers and Others, Sections 115 to 124.

In British Columbia, the *Workers Compensation Act* specifies the rights and responsibilities of employers and workers with respect to health and safety.

The *Act* describes the following basic responsibilities:

- Owners must provide and maintain their land and premises to ensure worker health and safety and provide employers and contractors with information regarding hazards.
- Employers must ensure the health and safety of their workers, inform workers of potential hazards, and remedy hazardous workplace conditions and practices.
- Supervisors must ensure the health and safety of all workers under their direct supervision and inform those workers of hazards.
- Workers must follow established safe work procedures, use any required personal protective clothing and equipment, and report hazards to their supervisor or employer.

Refusing unsafe work

Workers have the right to refuse work they believe is potentially hazardous to their own health and safety or that of other workers. In fact, according to the Regulation workers must not carry out or cause to be carried out any task that they have reasonable cause to believe would endanger the health and safety of any person.

Employer responsibilities

Even though there are many different types of live performance productions, certain basic requirements apply to all groups responsible for productions, including special events companies, volunteer or educational organizations, performance cooperatives, or larger performing-arts organizations.

Employers are responsible for the following health and safety requirements:

- Establish and maintain either a joint health and safety committee or a worker health and safety representative, as required by the *Act* (Part 3,

Division 4, Sections 125 and 139). For more information, see “Joint Health and Safety Committees and Worker Health and Safety Representatives,” page 8.

- Include risk assessments in production planning to identify potential fall hazards. For more information, see “Risk Assessments,” page 18.
- Implement a fall protection system if a fall from 3 m (10 ft.) or more is possible, or if a fall from a height of less than 3 m (10 ft.) carries an unusual risk of injury.
- Complete a fall protection plan if a fall of 7.5 m (25 ft.) or more could occur and there are no permanent guardrails, or if the fall protection system will be a control zone and safety monitor.
- Record the protective measures you have taken and keep them on file.

Completing a risk assessment and fall protection plan in the planning stages of production will not only help you establish due diligence for fall protection, but can also prevent serious accidents and save time, grief, and budget disasters. See Part 2 for information that will walk you through the planning process.

Health and safety coordinators

According to Part 3 of the Regulation, employers must implement an occupational health and safety program to help reduce workplace incidents and injuries. Although it is not a requirement, it is a good idea for employers to designate a health and safety coordinator from management who can develop and implement the program, and deal with other health and safety issues.

Who can be a health and safety coordinator?

A health and safety coordinator should be experienced, knowledgeable, and in a position to carry out the employer's health and safety responsibilities. Coordinators should act in good faith — that is, make reasonable decisions according to their background and knowledge. Employers should designate a responsible, capable person as health and safety coordinator. If appropriate, the coordinator can change as the production changes (for example, after opening or when touring begins).

What does a health and safety coordinator do?

A health and safety coordinator usually has the following duties:

- Develop and implement the employer's occupational health and safety program.
- Take part in the joint health and safety committee, if one is required.
- Take part in planning and design meetings.
- Communicate regularly with worker health and safety representatives. Give them opportunities to voice worker concerns.
- Bring up fall protection and other health and safety issues at production meetings.
- Document health and safety issues and initiatives.
- Help investigate and document incidents.

Joint health and safety committees and worker health and safety representatives



In the Act: See Part 3, Division 4 – Joint Committees and Worker Representatives, Sections 125 to 140.

Joint health and safety committees

All productions that regularly employ 20 or more workers must establish and maintain a joint health and safety committee. (*Regularly employed* means employed for at least one month, whether full-time or part-time.) The committee must include at least four members – usually two employer representatives and two worker representatives.

Worker health and safety representatives

Productions that regularly employ fewer than 20 workers are usually required to have at least one worker health and safety representative rather than a joint health and safety committee.

Although only one or two worker representatives are required, it is a good idea to have a health and safety representative for each group of workers – someone who is familiar with the issues they face. For example, there could be one health and safety representative for the running crew, one for performers, and one for the carpenters.

Who can be a worker health and safety representative?

Worker health and safety representatives must be appointed by the workers they will represent. Workers should choose someone who will be present for the run of the show. Workers who carry out managerial functions (for example, supervisors or crew chiefs) cannot act as worker health and safety representatives.

Responsibilities

Worker health and safety representatives should act in good faith, making reasonable decisions according to their background and knowledge.

Worker health and safety representatives (and committee members, if there is a joint health and safety committee) have the following duties:

- Identify situations that might be unhealthy or unsafe for workers.
- Recommend ways to eliminate or control potential hazards.
- Recommend ways to improve the production's health and safety program and the overall work environment.
- Consider and respond to health and safety complaints or recommendations from the cast and crew.
- Promote safe work practices.
- Make sure regular workplace inspections are carried out.
- Make sure incidents are investigated.
- Participate in workplace inspections and incident investigations.
- Make sure that all aspects of the production meet WCB requirements.

Part 2:

Getting Started

Overview

- Quick-start questions, page 12
- Types of fall protection, page 13
- Risk assessments, page 18
- Fall protection plans, page 20
- Worker instruction and training, page 22

Quick-start questions

Answer each of the following three questions to help determine what you need to do for fall protection on your production.

1. Will technicians or performers be working near unguarded edges at heights of 3 m (10 ft.) or more, other than on a temporary ladder, or in a bucket or scissor lift?

Think about:

- working on ladders, scaffolds, work platforms, balconies, catwalks, scenery, lifts, flying rigs, high steel, or near pits and traps
- build, set-up, hang, touch-ups, tech, run, and strike

☐ Yes

Your production needs fall protection. Complete the risk assessment checklist (see page 70) and follow safe work procedures.

Complete a written fall protection plan (see page 75) if technicians or performers will be working at heights of 7.5 m (25 ft.) or more without permanent guardrails, or if the fall protection system will consist of work procedures (for example, a control zone and safety monitor).

☐ No

Move to question 2.

2. Will technicians or performers be working at heights less than 3 m (10 ft.), but where a fall could involve unusual risk of injury?

Think about:

- working above an audience, an orchestra pit, or on platforms or risers above scenery
- build, set-up, hang, touch-ups, tech, run, and strike

☐ Yes

Your production needs fall protection. Complete the risk assessment checklist (see page 70) and follow safe work procedures.

Complete a written fall protection plan (see page 75) if technicians or performers will be working at heights of 7.5 m (25 ft.) or more without permanent guardrails, or if the fall protection system will consist of work procedures (for example, a control zone and safety monitor).

☐ No

Move to question 3.

<p>3. Will there be any other hazards while technicians or performers are working at height?</p> <p>Think about:</p> <ul style="list-style-type: none"> • working alone, with moving or falling objects, on slippery or unstable surfaces, in adverse weather conditions, near power sources, or with new crew • build, set-up, hang, touch-ups, tech, run, and strike 	<p><input type="checkbox"/> Yes</p> <p>Complete the risk assessment checklist (see page 70) and follow safe work procedures. Depending on the hazard, you may need to complete a written fall protection plan (see page 75).</p> <p><input type="checkbox"/> No</p> <p>You're done.</p>
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Types of fall protection



In the Regulation: See Part 11: Fall Protection.

Types of fall protection include:

- fall restraint (guardrails; safety belts or full body harnesses)
- fall arrest (full body harnesses)
- work procedures (control zones and safety monitors)
- other work procedures acceptable to the WCB

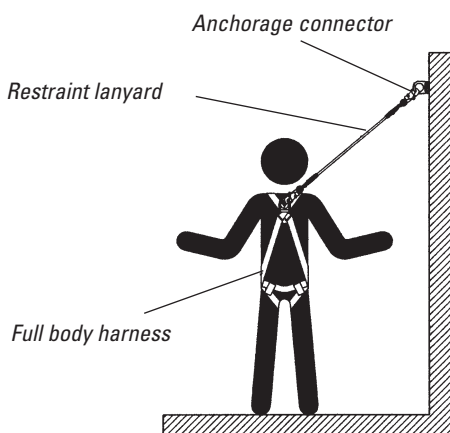
If fall protection is necessary, follow the fall protection hierarchy:

1. Use fall restraint before fall arrest.
2. Use fall arrest before work procedures.
3. Use work procedures only if you cannot use restraint or arrest methods.

Fall restraint systems

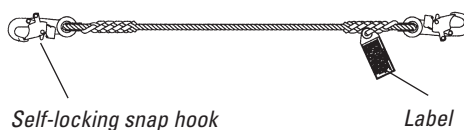
Whenever possible, use a fall restraint system to prevent workers from getting into a situation in which they can fall. Guardrails are the preferred type of fall restraint.

If guardrails are not practicable, each worker can use a safety belt or full body harness attached to a securely anchored lanyard or lifeline. The lanyard or lifeline must be arranged or its length adjusted to limit the worker's ability to travel. By limiting the distance that the worker can move, the system prevents the worker from getting too close to an unguarded edge.



This fall restraint system consists of a full body harness attached to a securely anchored restraint lanyard. The lanyard prevents the worker from getting too close to an unguarded edge by limiting the distance the worker can travel.

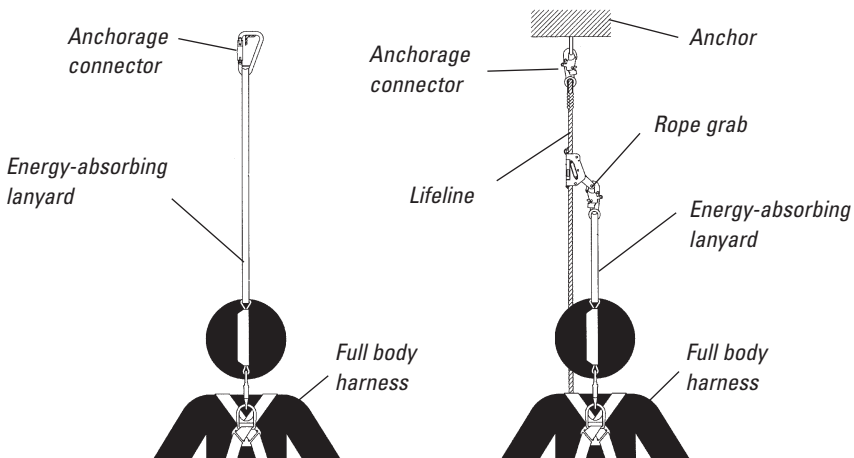
Rope lanyards are often used in fall restraint systems to attach safety belts or full body harnesses to secure anchor points.



Fall arrest systems

If a fall restraint system is not practicable, use a fall arrest system instead. A fall arrest system will not prevent a fall from occurring in the first place, but it will stop a worker's fall after a short distance, preventing the worker from hitting the surface below.

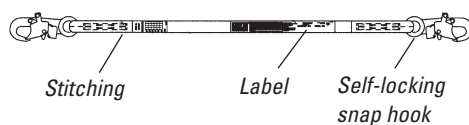
When using a fall arrest system, the worker must wear a full body harness attached to a securely anchored lanyard that will limit the fall to a safe distance. Full body harnesses are specially designed to help protect the worker against internal injuries if a fall occurs — do not use safety belts in fall arrest systems.



In this fall arrest system, the full body harness attaches directly to the anchorage connector via an energy-absorbing lanyard.

In this fall arrest system, the full body harness attaches to a rope grab via an energy-absorbing lanyard; the rope grab connects to a lifeline and secure anchor point.

Energy-absorbing web lanyards are often used in fall arrest systems to attach full body harnesses to secure anchor points or rope-grab-and-lifeline combinations.



Work procedures

If fall restraint and fall arrest systems are not practicable, use a work procedure. Work procedures are a final consideration for fall protection because they minimize, but do not eliminate, the possibility of falls.

One type of work procedure is a control zone and safety monitoring system. A control zone is an off-limits area between an unguarded edge of a building or structure and a safe zone in which workers can move about. If workers need to enter the control zone for any reason, a safety monitor keeps an eye on them while they are in the control zone. Work procedures can also include other procedures acceptable to the WCB.

Exceptions for live performance

Live performance presents unique difficulties when it comes to working at heights. For example, guardrails are often not practicable on scenic units that will be visible to an audience; similarly, full body harnesses and safety lines on performers are often not practical during performance. The WCB recognizes this and allows some exceptions to the use of standard protective equipment and clothing in performance situations “provided that effective measures are taken to protect performers and other workers from injury.” (For exceptions, see the Regulation, Sections 4.56, 4.59, 4.60, and 8.22.) *Effective measures* may include procedures described in “Safe Work Practices 2: The Rehearsal Process” (see page 26) and “Safe Work Practices 3: Safe Development of Production Components” (see page 29).

Fall protection equipment

Employers are responsible for providing workers with any necessary fall protection equipment. However, if employers and workers both agree, workers may use their own fall protection equipment as long as it meets WCB requirements and is appropriate for the specific task.

If you are inexperienced or unsure of what fall protection to use, consult the specialist on your production who is most qualified for the intended task.



Full body harnesses are available in an H-style (left) or an X-style (right). Some workers prefer the comfort of the H-style harness around the neck and shoulders. Other workers find the X-style harness to be more comfortable around the chest. Pick the type of harness that best fits your body.

Risk assessments

Employers must ensure that risk assessments are carried out for each individual production. Employers in the live production industry typically assign risk assessments (and other health and safety tasks) to supervisors and workers. Risk assessments consist of three basic steps:

1. Identify hazards and unsafe work practices.
2. Determine the risks associated with each hazard or unsafe work practice.
3. Deal with each hazard or unsafe work practice.

It is important to record your risk assessments, in case you need to refer to them later. Use the risk assessment checklist in Appendix F, page 70.



Defining *hazards* and *unsafe work practices*

According to the Regulation, a *hazard* is “a thing or condition that may expose a person to a risk of injury or occupational disease.” For example, a badly frayed strap on a full body harness is a hazard.

An *unsafe work practice* is an action that is being carried out without regard for an established safety procedure. For example, not using a full body harness when one is required is an unsafe work practice.

1. Identify hazards and unsafe work practices

The creative team should collaborate with the production team and the health and safety coordinator to identify fall hazards and unsafe work practices for technicians and performers. Consider work during all stages of production: build, installation, performance, and strike. If necessary, inspect the performance venue to verify actual working conditions and hazards. Venue staff can quickly point out important structural aspects and eccentricities of the venue. Venue staff can also supply you with any venue-specific safe work practices and requirements.

2. Determine the risks

Assess each hazard and unsafe work practice to determine possible risks. Assess risks separately for technicians and performers: fall protection issues may be different for technicians involved in construction and installation than for performers involved in rehearsal and performance.

There may be more than one risk for any hazard. For example, you may note that the production calls for a non-conforming staircase on stage, a potential hazard that presents risks to different workers at different times, including:

- performers walking up the staircase during performance
- technicians working on the staircase during the show
- technicians working on the staircase, disassembling part of the scenery when striking the set

If your production includes highly technical elements such as performer flying or high-steel work, make sure you have the necessary knowledge and expertise to assess these elements, or hire someone who does.

3. Deal with each hazard or unsafe work practice

Whenever possible, eliminate hazards by finding safer ways to carry out tasks. If you cannot eliminate a hazard, find a way to control it and minimize worker risk:

- Can you redesign the task to eliminate the fall hazard?
- Can you install guardrails?
- Is a fall restraint system appropriate?
- Can you reduce the potential fall distance by installing platforms or nets?
- Can you use an elevating work platform, scaffold, or bucket or boom lift?

If you want to use alternative fall protection strategies, you need adequate planning, development, and rehearsal time. If you cannot follow standard safe work practices and do not have enough time to address a hazard using a customized or creative solution, you may need to eliminate or rethink the sequence in question.

Fall protection plans

When are fall protection plans required?

Employers must ensure that decisions are documented in a written fall protection plan if:

- technicians or performers will be working at heights of 7.5 m (25 ft.) or more without permanent guardrails
- the WCB directs the production to do so because a fall from a lower height could involve unusual risk of injury
- the fall protection system will consist of work procedures (for example, a control zone and safety monitor)

Even if you are not required to complete a plan, briefly documenting your decisions can be useful for future reference and can establish due diligence. Use the fall protection plan in Appendix F, page 75.

What should the fall protection plan include?

The fall protection plan should include detailed rehearsal and performance plans. All fall protection plans must specify:

- the fall hazards expected during each production phase
- methods to prevent or mitigate the hazards
- procedures to assemble, maintain, inspect, use, and disassemble fall protection systems
- a rescue plan for aiding workers who fall and are left suspended at height, unable to rescue themselves

Rescue plans

The rescue plan should answer the following questions:

- If workers at risk fell, what would likely happen?
- Would self-rescue be possible?
- If not, could rescuers get to the workers?
- What equipment and techniques (including qualified experts) would you need and how will you provide them?

Safety measures for customized equipment

If a performer will be using customized equipment — including harnesses and fly hardware (rated equipment made into a customized system) — describe the measures the production will take to be as safe as possible. The following are examples of safety measures:

- Writing a detailed rehearsal and choreography plan.
- Using equipment designed for the forces that will be exerted on it. (See “Safe Work Practices 3: Safe Development of Production Components,” page 29.)
- Appointing a qualified person to inspect the equipment before each use.

Review and update the fall protection plan

Review the fall protection plan carefully before implementing it. As productions develop, conditions and creative plans may change. Review the fall protection plan regularly, and be prepared to make and document any necessary additions or changes. If you change things on the fly, make sure you note it on the production’s risk assessment checklist and fall protection plan.

Make changes as required by the venue

If you did not see the venue before completing the risk assessment checklist and fall protection plan, you may need to review and update them upon seeing the venue. This applies particularly to touring shows, where you need to reassess hazards at each new venue. Even if you have been in the venue before, quickly reassess it when you arrive. Things may have changed since the last time you were there.

Formalize continual risk assessment

The health and safety coordinator should make sure risk assessment is on the agenda at production meetings and briefly document each reassessment (i.e., add to the risk assessment checklist and fall protection plan).

Worker instruction and training

Employers are responsible for providing workers with information, instruction, training, and supervision so they can carry out their work safely. Follow these guidelines:

- When hiring technicians and performers, be clear about the specific requirements of the job if it will involve working at heights.
- Inform workers of relevant hazards.
- Post your risk assessment checklist and fall protection plan, and any subsequent amendments to them.
- Instruct and train workers in rescue procedures and how to use fall protection methods and equipment.
- Document all crew talks, training programs, and rehearsals, including attendance. (Use your fall protection plan form.)

Discuss fall protection at crew meetings

Supervisors or crew chiefs must run through fall protection and other health and safety issues at the first crew meeting. Follow these guidelines:

- Inform workers where the risk assessment (and fall protection plan, if there is one) is posted before working at heights begins.
- Address the safety aspects of the work as well as the technical requirements, particularly when the task involves unusual or unwieldy equipment.
- Ask workers to elect a worker health and safety representative.

With new crew, discuss fall protection and other health and safety issues in an orientation, before they begin work. Introduce them to their worker health and safety representative.

Part 3:

Safe Work Practices

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Safe work practices 1: General safety guidelines

Falling objects

If there is a risk of head injury from falling or thrown objects (for example, flown scenery, lighting equipment, tools, or tail ends of cable), all workers in the hazard area must wear hard hats. Although some companies provide hard hats, workers are responsible for providing their own approved hard hat, if necessary. Follow these requirements:

- Keep your hard hat clean. Do not use solvents to clean it; they weaken the plastic.
- Do not drill holes in your hard hat. Do not paint it or apply stickers.
- Inspect your hard hat regularly. If it is cracked or damaged, replace it.
- Warn anyone not wearing a hard hat in an area where hard hats are required to keep clear of that area.

Before working at heights, empty your pockets and strap loose tools to your body. If you are using a hard hat, fasten the chin strap. If you need to work with loose tools, materials, or equipment (for example, when loading a counterweight arbor), make sure the area of immediate hazard below is cleared of people and marked as a danger zone. Position objects as securely as possible so nothing gets accidentally knocked overboard.

Low light levels

If performers or technicians will be working in low light conditions, follow these guidelines:

- Install running lights backstage.
- Mark unguarded edges, when possible, with conspicuous warning markers such as white tape, glow tape, LED lights, or laser markers. Do not rely entirely on electrical illumination in case of a power failure.
- Make portable lights (such as trouble lights, forehead flashlights, and mag lights) easily available to technicians who will be working near unguarded edges.
- Include the running crew and technicians in technical rehearsals so they can orient themselves to the conditions.

Slippery or unstable surfaces

Performers and technicians must wear footwear that protects against existing hazards. (See the Regulation, Sections 8.22 and 8.23, Footwear.) If it is not practicable for a performer to wear standard safety footwear, the employer must take other measures to protect them from injury, such as fitting costume shoes with non-slip soles, changing the floor surface, or otherwise removing the hazard.

Working alone

Avoid working alone at heights unless it is absolutely necessary. See the Regulation, Sections 4.21 to 4.23, Working Alone or in Isolation.

High voltage

Do not violate the limits of approach when working near energized high-voltage electrical equipment. According to the Regulation, high voltage “means a potential difference (voltage) of more than 750 volts between conductors or between a conductor and ground.” See the Regulation, Sections 19.24 to 19.29, Working Close to Energized High Voltage Equipment and Conductors.

Strike

When you do your risk assessment, be sure to include the work that will be done at heights when striking. Circumstances can be more hazardous during strike: there is often a sense of urgency, crew sizes may have changed, all departments may be working at the same time, and fatigue is often a factor.

If the install required special equipment, make sure you have it for the strike. Ensure that stairways and other access methods are left intact until workers do not need access to the areas they serve.

Safe work practices 2: The rehearsal process

Rehearsal is a fundamental safe work practice in the live performance industry. If a falling hazard cannot be eliminated during the design and construction phases of production, use the rehearsal process to introduce workers to the hazard and train them in how to deal with it, proceeding gradually from no risk to performance-level risk.

Theatrical convention holds that a play usually requires one hour of rehearsal for each minute of actual performance. Complicated sequences and parts of the action that expose workers to a hazard may require far more rehearsal time.

For an example of the rehearsal process, see Appendix D.

Pre-rehearsal planning

Follow these guidelines and requirements to prepare for rehearsals:

- Consider fall protection and general safety when you discuss how the artistic concept will be brought to life. Build in the cost of fall protection strategies when you budget.
- Conduct a risk assessment to identify, assess, and eliminate or control hazards and unsafe work practices. Continue to assess risks as the production develops and conditions change. For more information, see “Risk Assessments,” page 18.
- Complete a fall protection plan that includes information such as hazards, prevention methods, safe work procedures, and rescue plans. For more information, see “Fall Protection Plans,” page 20.
- Make fall protection a part of all pre-production planning and communication. Allow enough lead time for adjustments to be made for each venue.
- Hire performers and technicians who are sufficiently trained, experienced, and comfortable performing the tasks required.
- Ensure that performers elect a worker health and safety representative. For more information, see “Joint Health and Safety Committees and Worker Health and Safety Representatives,” page 8.

- Schedule adequate rehearsal time to deal with hazards. Allow time for additional rehearsals throughout the run, if necessary. Make sure understudies and replacements have enough rehearsal time to perform in the sequence with an adequate level of comfort and safety.

Communicating with workers

Follow these guidelines for orienting and updating performers and technicians:

- Orient performers and technicians at the beginning of production or when arriving at a new performance venue. Point out hazards such as traps and other unguarded edges. Stress that all workers, including out-of-province workers, must fully comply with B.C. health and safety requirements. When working outside of B.C., workers must comply with the requirements of the jurisdiction in which they are working.
- Discuss the risk assessment and fall protection plan with performers and technicians. Focus on performance risks and how to mitigate them. Give workers an opportunity for feedback.
- Update performers and technicians on changing set conditions (for example, draw attention to an open orchestra pit, a new floor opening, and other unguarded edges).
- Ensure that performer replacements have at least the same qualifications as the original performer, and that they read the risk assessment and fall protection plan, revisit the rehearsal process, and agree with all of the arrangements before working. To balance the eagerness of performers to step in, ensure that a worker health and safety representative is present during this process.

Rehearsal guidelines

Follow these guidelines for rehearsals:

- Deal with performance hazards by developing blocking or choreography that eliminates or mitigates risks, or by altering the technical parameters of the hazardous sequence. Consult with all involved parties, including performers, worker health and safety representatives, and the health and safety coordinator.
- Ask the stage manager to document fall protection issues and solutions in the daily production notes. Ensure that these notes are on the agenda and discussed at weekly production meetings, and with appropriate technicians and performers.
- Check all fall protection equipment before each use.
- Make sure that technicians checking a performer's safety arrangements are protected from injury while doing so.
- Upon arriving at the venue, conduct a spacing or orientation rehearsal.
- Dry-run all sequences involving special effects, pyrotechnics, stage machinery, or any other technical hazard.
- Do a full run-through of any sequence believed to be hazardous by a performer, a worker health and safety representative, or the health and safety coordinator.

Safe work practices 3: Safe development of production components

Use the safe development process to identify and resolve health and safety issues for potentially hazardous production components (for example, scenery used to fly performers or a costume that includes stilts). The safe development process is a normal part of production design that can be initiated at any time during production. Documenting the process in your fall protection plan helps establish your due diligence.

The safe development process consists of three basic steps: development, testing, and rehearsal.



Note: Before beginning the safe development process, make sure the production team and creative team complete a proper risk assessment.

For an example of the safe development process, see Appendix E.

Development

Use research and design to resolve health and safety concerns. Conduct development in consultation with and to the satisfaction of performers, worker health and safety representatives, and the health and safety coordinator, if there is one.

Testing

Test any production component that interacts or has the potential to interact with performers or other workers. For initial tests, use non-live loads such as sand bags. For secondary tests, use controlled live loads with appropriate safety measures such as fall arrest harnesses to simulate and exaggerate performer movement and interactions. Carry out final tests with all other production components that could affect the health and safety aspects of the component under development (for example, adjacent performer or scenery movements, lighting conditions, or sound levels).

Rehearsal

Provide all performers working on or with potentially hazardous components with sufficient orientation and rehearsals to eliminate or mitigate the risks. (See “Safe Work Practices 2: The Rehearsal Process.”)

Components visible to the audience

Generally, all production structures and components must meet the standards outlined in the Regulation. However, the WCB allows exceptions for props, scenic units, and effects components that will be visible to the audience, **as long as effective measures are taken to ensure that workers are protected from injury**. This means that in situations where WCB requirements are not practicable, you can use the safe development process (in conjunction with the rehearsal process) to identify and resolve health and safety issues. This exception does not release you from the obligation to use professional engineering when necessary.

Entering new territory

If you are trying something for the first time, ask a trusted and respected colleague who has done something similar how they would approach the component design, or consider hiring a specialist or engineer.

Consult or hire an engineer to help develop production components when:

- the development process does not adequately address the engineering principles involved
- you want to ensure peace of mind and due diligence

Refusing unsafe work

At any point in the safe development process, any workers involved can and must speak up if they feel the process is inadequate and the resulting production component will not effectively mitigate the hazard. If a worker expresses a concern, work to find a solution that satisfies everyone involved. Provide additional rehearsal time for the performers to increase their comfort level, change the sequence, or cut it from the production.

Safe work practices 4: Unguarded edges



In the Regulation: See Sections 4.54 to 4.63, Work Area Guards and Handrails.

You are working at height if you are working near an edge that is:

- 3 m (10 ft.) or higher
- less than 3 m (10 ft.), but where a fall could involve an unusual risk of injury



Note: Section 4.55 of the Regulation mentions a requirement for guardrails at heights of 122 cm (4 ft.) or more. This requirement is only intended for structures such as loading docks and **does not** apply to performance stages and scenic units visible to audiences.

When working near edges such as stages, balconies, catwalks, and traps, workers need to look out for one another — particularly directors blocking performers, and stage performers working above pit musicians.

Notify all workers of changes to their work environment. For example, tell them if the pit is open and the drop has significantly increased, or if unguarded edges are hidden by drapery.

Technical setting vs. rehearsal or performance setting

Follow these guidelines:

- Clearly establish when work zones will change between the technical setting and the rehearsal or performance setting so appropriate protective measures can be implemented. For example, when shifting from a focus call to a technical rehearsal, technicians may need to replace guardrails used during the focus call with alternative fall protection intended for rehearsal and performance.
- If practicable, leave standard fall protection measures used to protect technicians during work calls in place to protect performers (for example, during technical rehearsals).
- If reassembling protective devices is impractical between shows or during maintenance, protect workers by using the systems in place for performers, but only if these measures are safe given the risk involved and you reorient the technicians to the altered risk.
- If the running crew will be working near edges during the performance (for example, follow-spot operators), provide them with appropriate fall protection and include them in the rehearsal process.

Traps

When not in use, cover traps or surround them with guardrails. See the Regulation, Section 4.59.

If practicable, mark trap perimeters with glow tape, LED lights, white tape, or laser markers. Do not rely exclusively on electrically powered systems, in case of a power failure.

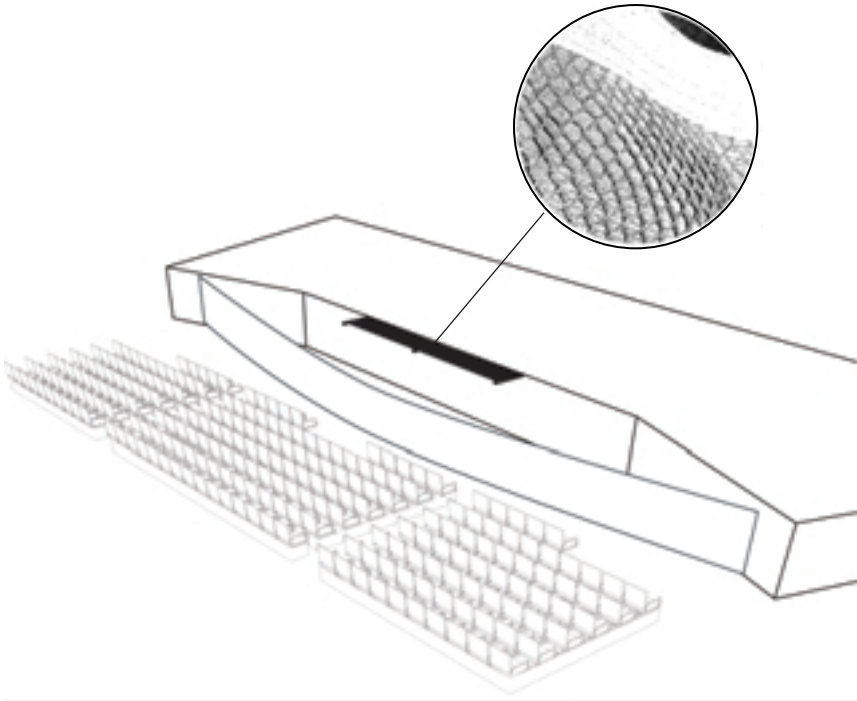
Orchestra pits

If there is no orchestra pit cover, follow these guidelines:

- During technical installation, adjustments, rehearsal, and strike, use a control zone and safety monitor system (see “Work Procedures,” page 16). Mark the unguarded edge of the stage as you would mark a trap (see “Traps,” above). Install toe guards where possible, painting or marking them so they are highly visible.
- During performances, mark the unguarded edge so it is not visible to the audience (for example, use LED lights). You should also use battery power or a UPS system for backup.
- Prevent wheeled equipment from rolling into the pit.
- Install safety nets over open orchestra pits to catch falling objects dropped from the stage.



Note: Double-layer safety nets have a smaller net to catch falling objects and a larger net engineered to catch falling persons. However, double-layer safety nets are generally not used in live production because the requirements for installing personnel safety nets are strict.



Safety nets installed over orchestra pits help catch falling objects, preventing injury to performers in the pit. Live-performance safety nets typically consist of a mesh net with a black cloth layer on top. The inset illustrates the underside of such a net.

Safe work practices 5: Ladders



In the Regulation: See Sections 13.1 to 13.14, Ladders.

There are three categories of ladders used in live-performance work:

- portable ladders (straight ladders, extension ladders, A-frame ladders, and stepladders)
- wheeled A-frame ladders
- permanent ladders (access ladders and escape ladders)

Use ladders that meet CSA or ANSI standards. Ladders may be used without fall protection for light-duty tasks of short duration only. If the job will take longer, use another method such as a personnel lift.

Raising and lowering items

Workers must not climb ladders while carrying heavy or bulky objects that may make ascent or descent unsafe. Either position yourself securely on the ladder and rope the item up or down, or attach a pulley block to a rated overhead grid or rigging point and have ground crew raise or lower the object (see the illustration on page 37). If you are roping the item by hand, make sure the ladder is secure enough for you to do so safely (for example, tie off the ladder at the top and secure it at the bottom or have ladder assistants foot the ladder).

Working with ladder assistants

When necessary, use ladder assistants to:

- foot the ladder
- keep people out of the area
- hook up and raise or lower equipment or materials on a rope



Note: The use of ladder assistants does not constitute fall protection.

Portable ladders as scenic units or props

A portable ladder constructed at the job site must meet WCB requirements unless it will be used as a scenic unit or prop that will be visible to the audience. If a ladder is designed and constructed for use as a visible scenic unit or prop:

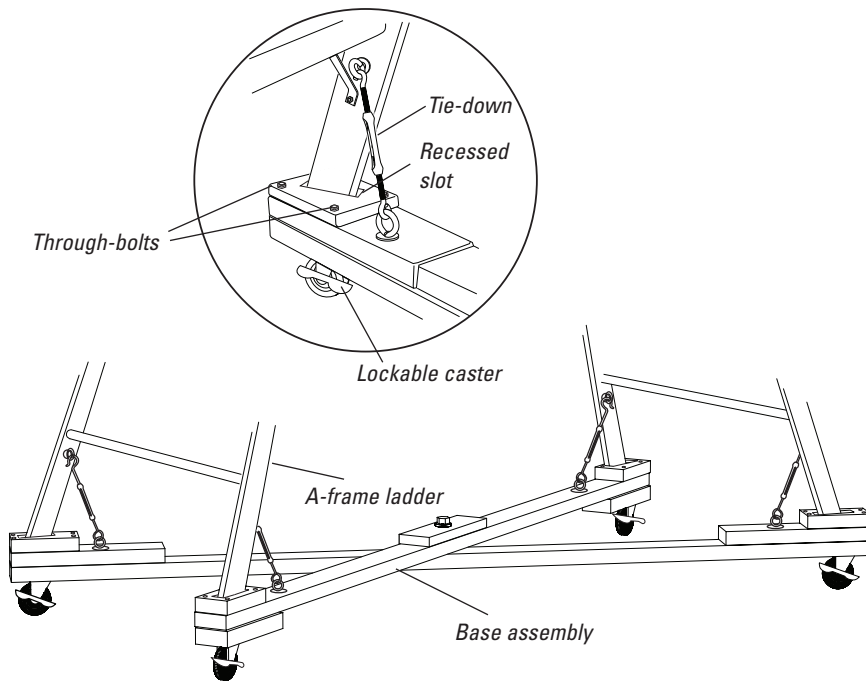
- inform all technicians that the ladder is for performance only
- mark the ladder “for performance only” when it is not being used in performance or rehearsal

Wheeled A-frame ladders

Whenever possible, use a lift for working at heights (see “Safe Work Practices 7: Lifts”). If a lift is not practicable for your production or the task at hand, you may use a wheeled A-frame ladder. Wheeled A-frame ladders are extension trestle ladders mounted on a castered base (see the illustration on page 36). Avoid using casters mounted individually on each leg of the ladder. Instead, secure the ladder to a wheeled base assembly.

Follow these guidelines for wheeled base assemblies:

- Use lockable casters.
- Make sure each caster is rated to support the design working load of the ladder. (The Regulation requires that casters be designed to support four times the design working load, hence with four casters each individual caster must support the design working load of the ladder.)
- Attach casters to the base assembly using through-bolts, not screws.
- Position casters directly under the ladder feet and make sure they are able to rotate freely without jamming.
- Make sure the base assembly extends far enough beyond each foot so the casters can swing freely without jamming against adjacent objects.

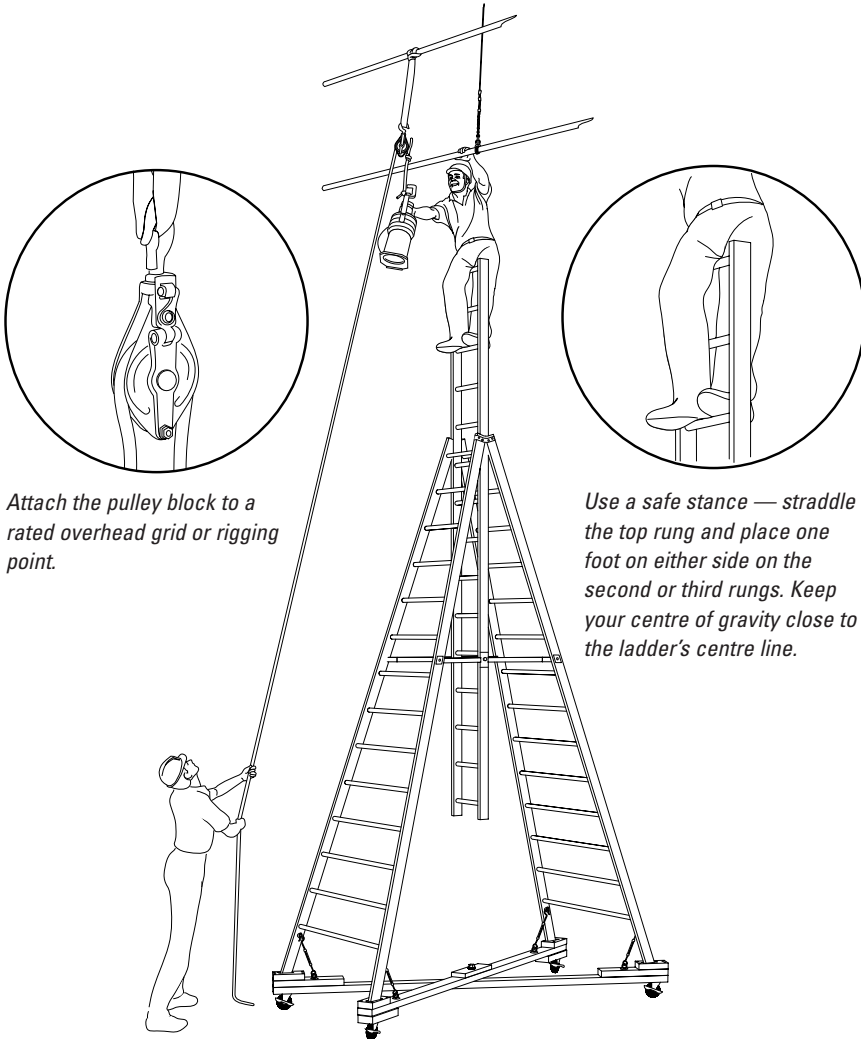


A well-designed base assembly for a wheeled A-frame ladder should include lockable casters securely attached to the assembly using through-bolts. To ensure ladder stability, fit the ladder feet in recessed slots and secure them using tie-downs.

Working from the top of a wheeled A-frame ladder

The safest way to work from a wheeled A-frame ladder is to sit on the top rung. Follow these guidelines:

- Have an assistant present while you get into position.
- Make sure the casters are locked and the ladder is stable before climbing it.
- Straddle the top rung of the vertical extension, placing one foot on either side on the second or third rungs. Keep your centre of gravity close to the ladder's centre line. When moving into or out of position, keep both hands free and move carefully until you are comfortable and stable.



When working from the top of a wheeled A-frame ladder, the safest way to raise or lower an item is to have an assistant raise or lower the object using a pulley block.

Moving workers on wheeled A-frame ladders

You can move a worker on a wheeled A-frame ladder only if you are making small movements for tasks such as focusing adjacent light fixtures or tying soft goods along a pipe and are operating on a level surface free of potential hazards. In addition, you must follow these safety guidelines:

- Do not move the worker to another work area or allow the worker to “monkey bar” their way overhand to a new work area.
- Use two safety monitors to hold and move the ladder at its base, and lock the wheels when the ladder is close to an edge.
- Set clear communication protocols between the worker on the ladder and workers on the ground. The worker at the top of the ladder should direct all ladder movement.

Safe work practices 6: Scaffolds



In the Regulation: See Sections 13.15 to 13.92, Scaffolds.

According to the Regulation, scaffold “means any temporary work platform and its supporting structure used for supporting workers, or materials, or both.” Scaffolds must meet the safety standards specified in Section 13.17. The only exceptions are scenic units or props that will be visible to the audience during performance (see “Scaffolds as Scenic Units or Props,” page 41).

Erecting scaffolds

A qualified worker (for a definition of *qualified*, see Appendix A) must supervise scaffold erection and dismantling. Follow these safety guidelines when erecting scaffolds:

- Follow the manufacturer’s and supplier’s instructions and meet WCB requirements.
- Erect scaffolds on solid footings. If necessary, use screw jacks to level scaffolds.
- Secure and rigidly brace the uprights to prevent swaying and movement. If a scaffold is higher than three times its minimum base dimension, secure the scaffold to the adjacent structure or use guylines and/or outriggers.
- Do not erect scaffolds near power lines or other energized high-voltage electrical conductors. If necessary, contact the local power company.
- Install required guardrails and toeboards on platforms that are 3 m (10 ft.) or higher.
- Do not mix and match components. Keep erection drawings on site.
- Use fall protection equipment when erecting or dismantling scaffolds with platforms that are 3 m (10 ft.) or higher.

Using scaffolds

Inspect scaffolds daily before using them and after any modification. Follow the manufacturer's and supplier's instructions and replace any damaged components.

Follow these safety guidelines when climbing or working on a scaffold:

- If guardrails cannot be installed on the scaffold, use personal fall protection equipment.
- Use a ladder, stairway, or other safe means to access the scaffold's working landings (see the Regulation, Section 13.28). Do not climb the outside of scaffold frames between landings.
- Do not use ladders or makeshift devices on top of scaffolds to increase the height.
- Never overload a scaffold with materials or people. Do not exceed the manufacturer's and supplier's load specifications.
- Secure and belay equipment when hoisting it up and down. When lifting materials more than three frames high from the ground, use a well wheel and davit. Secure equipment on top to the main framework of the scaffold.
- Do not remain on a rolling scaffold while others are moving it if the scaffold is higher than twice its minimum base dimension.
- Do not remain on a rolling scaffold if you are moving it and the platform is higher than one and a half times the scaffold's minimum base dimension.
- Do not work on a draped scaffold in outdoor conditions unless a professional engineer has determined that it is safe to do so in those conditions at that particular venue.
- Objects mounted on scaffolds can disrupt the scaffold's weight balance, making it unstable. Use counterweights or bracing if necessary.

Scaffolds as scenic units or props

A scaffold must meet all WCB requirements unless it will be used as a scenic unit that will be visible to the audience. If a scaffold is designed and constructed for use as a visible scenic unit and it does not meet all WCB requirements, you must include it in your fall protection plan. You must also:

- inform all technicians that the scaffold is for performance only
- mark the scaffold “for performance only” when it is not being used in rehearsal or performance
- provide an effective means of fall protection for workers (see “Safe Work Practices 2: The Rehearsal Process”)

Follow the processes outlined in “Safe Work Practices 3: Safe Development of Production Components” and “Safe Work Practices 2: The Rehearsal Process.”

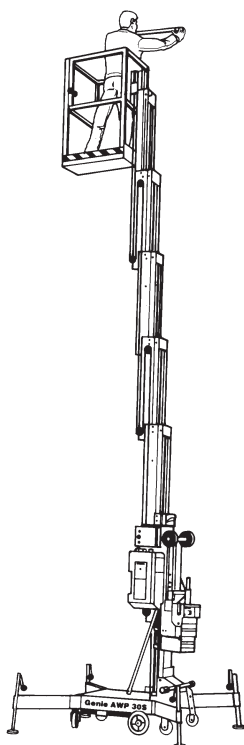


*Company: Joe Ink
Choreographer: Joe Laughlin
Production: “Swing Theory”
Dancers: Allison Hiscott,
Sandra Botnen, Tonja Livingstone,
Lynn Sheppard
Photo: Avril Patrick*

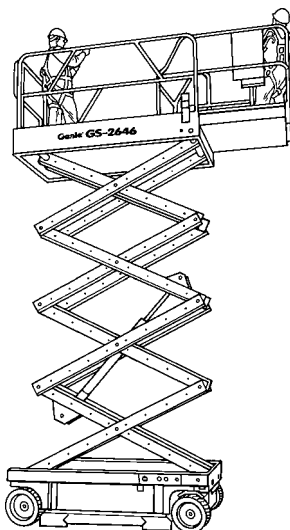
Safe work practices 7: Lifts

i *In the Regulation: See Sections 13.103 to 13.122, Elevating Work Platforms.*

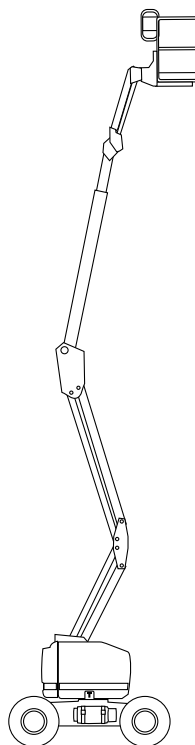
Lifts (usually bucket or scissor lifts) are ideal for working at heights in the live production industry because they have built-in guardrails and, except in the case of boom lifts, operators usually do not require full body harnesses. Lifts are also easy to move around for minor adjustments and they leave both hands free for the work to be done.



Bucket lifts are single-person telescopic vertical lifts. Some bucket lifts are self-propelled.



Scissor lifts are vertical lifts that are scissored rather than telescopic, and which can hold one or more people.



Boom lifts are mounted on an arm that may be articulated (above) or telescopic.

According to the Regulation:

- *boom-supported elevating work platforms* include boom lifts
- *elevating work platforms* include bucket lifts and scissor lifts
- *self-propelled* “means the capability of an elevating work platform to be power propelled with the primary controls on the work platform”

All personnel lifts must meet CSA or ANSI standards and WCB requirements. The following table outlines some basic requirements for personnel lifts commonly used in live performance.

Basic requirements for personnel lifts

Type of lift	Annual lift certification required?	Harness required?	Suitable for sloping ground?
Bucket lift	No	No, as long as operating on a firm, substantially even surface with all guardrails and chains in place	No
Scissor lift	Yes	No, as long as operating on a firm, substantially even surface with all guardrails and chains in place	No
Boom lift	Yes	Yes	Yes, when used according to manufacturer's instructions

Inspecting lifts

Inspect lifts before each use, and take the following steps to ensure safe operation:

- If you find any defects that might endanger technicians or performers, repair the lift immediately or tag it and remove it from service.
- Keep inspection and maintenance records for each lift. Some lifts must be certified annually (see table on page 43). Check the equipment decal to ensure the certification has not expired.

Operating lifts

Lifts must be operated by trained, qualified crew members. Follow these safety guidelines and requirements:

- Follow the manufacturer's instructions and WCB requirements. Keep the operating manual on-site.
- Before operating the lift, check the area for potential hazards, including traffic, power sources, floor openings, and slopes.
- Make sure the lift base and supporting ground are levelled and plumbed. On inclined surfaces, use wheel chocks and blocking.
- Look out for overhead power lines and high-voltage devices. When working near power lines, stay outside the limits of approach (see the Regulation, Sections 19.24 to 19.29).
- Do not overload the lift. Never exceed the manufacturer's specified load limit.
- Do not try to increase lift height by placing ladders, planks, or other objects on top of the platform.
- Set the braking system before elevating crew members.
- Do not sit or climb on the railings of the basket or platform.
- Set clear communication protocols to be used between workers on the platform and those on the ground. Make sure all workers understand and use them.
- Lock out unattended personnel lifts.
- Do not use the lift in extreme weather conditions such as thunderstorms, heavy rain, or high winds, unless specific measures have been taken to guarantee safety. In electrical storms, workers must get off the lift.

Moving lifts while workers are on them

You can only move personnel lifts that are elevated with workers on them in accordance with the manufacturer's or supplier's specifications. Ensure that all guardrails and chains are in place. The ground assistant should pay close attention to the rate of travel and communicate with the worker on the platform according to pre-set protocols. See "Safe Work Practices 8: Communication Protocols."

Safe work practices 8: Communication protocols

Generally, workers at height should dictate any movement of themselves or the equipment in their immediate area. Workers below should never make such moves unless the person working above has asked them to.

If you need to move a counterweight or other fly pipe that is near a worker on a ladder or lift, or the worker is on the grid or loading gallery, get permission from the worker at height before moving the item.

If you drop an object from a height, immediately yell “Heads!” If you hear someone yell “Heads!” duck and cover; **do not look up**.

Moving workers on wheeled A-frame ladders, scaffolds, or bucket lifts

If you are making a minor adjustment and need to move a worker on a wheeled A-frame ladder, scaffold, or lift, follow this procedure:

1. Worker at height: Make sure your head is clear of the grid and the space is clear of cables. Initiate the move by saying “Ready to move” and indicating the location or direction (for example, “Stage left, one foot”).
2. Assistant below: Before moving the ladder or lift, make sure the path is clear, then say “Moving.”
3. Worker at height: When you reach the new location, say “Stop.”

Assistants at the bottom of a ladder, scaffold, or lift should pay close attention to the worker above. Designate one assistant as the operator. The operator is responsible for:

- communicating with the worker above
- making sure the path is clear of obstructions and other workers
- making sure people in the area know there is someone working overhead

Safe work practices 9: High steel

High-steel work is risky and can have severe consequences. Workers in high steel must use continuous fall protection.

Hiring workers

High-steel requirements are highly technical. If the work exceeds your expertise or that of your team, consider contracting a company with the appropriate experience and expertise. There is no standard certification for entertainment industry riggers, so their qualifications may be difficult to assess. Check resumes and references carefully before hiring workers and consultants.

Fall protection systems

Never allow workers to walk on unsecured system pipes. If workers are walking on secured trusses or high steel, use one of the following fall protection systems:

- a harness and permanently installed horizontal lifeline
- a harness and temporary horizontal lifeline fixed to two or three anchor points
- a harness connected to two lanyards anchored to structural features that support the weight of the individual, so the worker can “leapfrog” the lanyards, ensuring continuous protection by constantly keeping one or the other attached to an anchor point
- a fall arrest system using a temporary vertical lifeline and harness connected so as to prevent a swing-fall hazard

Always double-check the safe work loads of pipes, grids, and safe anchor points, and minimize swing-fall hazard.

Alternative solutions

If there is no permanent fall protection system and it is not practicable to install a temporary fall arrest system, use another means of access or change the production design. Consider using specialty lifts, staging, scaffolds, or permanently engineered systems.

Safe work practices 10: Performer flying and aerial stunts

Performer flying and aerial stunts are specialized and complicated tasks that require research and planning for even the simplest effects. The safe work practices in this section provide general guidelines that you can use as a starting point. These guidelines **do not** deal with specific technical details of rigging. When incorporating performer flying or aerial stunts into a production, always consult detailed sources of information.

Depending on the complexity of the effect, you may also need to hire a specialist who has the expertise and equipment to plan and execute the effect safely and effectively. For references, please contact SHAPE.

Possible sources of further information include:

- Entertainment Services and Technology Association (ESTA)
- North American Association of Flying Effects Directors (NAAFED)
- United States Institute for Theatre Technology (USITT)

For contact information, see Appendix C, pages 59 and 60.

Basic responsibilities

Ensure that performers and technicians involved in performer flying or aerial stunts:

- have the knowledge and training (through adequate rehearsal) to operate the equipment and perform the effect safely
- are aware of any potential hazards involved in operating the equipment and performing the effect
- know who is responsible for each aspect of the effect

Ensure that qualified workers carry out the following tasks:

- design of equipment (the system)
- construction, assembly, and rigging of the effect
- operation, inspection, and maintenance of equipment
- inspection, maintenance, and storage of fly or rigging gear
- rehearsal of the effect
- pre-performance check of system components
- performance of the effect
- communication of all relevant information to everyone involved

Responsibilities of the effect coordinator

Assign an effect coordinator who will design and supervise aerial effects used in the production. The effect coordinator's responsibilities include the following:

- Rig and install the equipment or ensure that a qualified person does so.
- Train and rehearse the effect operators and performers.
- If the effect coordinator will not be present during performances, train a member of the running crew to carry out pre-performance maintenance and inspection of all system components, and to call for any necessary stunt or fly warm-up before the performance.
- Train and rehearse backup operators and understudies (if there are any) to the same level of expertise as the operators and performers they may have to replace.

All rehearsals must follow the process outlined in "Safe Work Practices 2: The Rehearsal Process."

Guidelines for preparing the effect

Follow these safety guidelines for design and construction:

- When practicable, incorporate a hands-off catch (a fail-safe system used on a line to prevent a fall if a worker slips or takes both hands off the line) into the system. Devise a method to safely retrieve the performer in case the hands-off catch is used.
- Use hardware that is of the highest quality, the appropriate strength, rated and marked by the manufacturer, and in as-new condition. Develop custom-made equipment according to the procedures outlined in "Safe Work Practices 3: Safe Development of Production Components."
- When practicable, design the system so that the failure of any single component will not result in an accident. If this is not possible, use stronger components.
- Use only the best rigging practices. For example, take precautions to eliminate chafing of lines attached to steel-work and use passive secondaries to back up components where appropriate.

Follow these safety guidelines for operation:

- The operator, performer, and ground crew should agree on a clear communication protocol, including a fail-safe sequence of “safe to go” signals.
- Ensure that performers and operators have clear access to the load-in point (the area where performers are hooked up to the flying system or where production components are hooked up to the rigging system).
- Ensure that the operator is in a position that is secure and free from distraction.
- If the operator cannot hook up the performer, assign a qualified person to do so.
- Ensure that there is sufficient visibility to hook up, check, and operate the system components safely.
- Keep the drop zone, fly area, and landing point clear of obstructions.

Appendices

Overview

- Appendix A: Terms, page 52
- Appendix B: Core WCB requirements for working at heights, page 57
- Appendix C: Resources, page 58
- Appendix D: Sample rehearsal process, page 62
- Appendix E: Sample safe development process, page 65
- Appendix F: Forms, page 69

The forms included in Appendix F include a risk assessment checklist, a fall protection plan, and an information sheet for worker health and safety representatives.

Appendix A: Terms

Act, the

The *Workers Compensation Act*.

aerial stunts

Manoeuvres or tricks involving rope or cable, where the performer has control over the speed or direction of travel. Compare with *performer flying*.

anchor

A secure point of attachment for a lifeline or lanyard.

block

To arrange, in onstage rehearsals, the precise movements and positions that performers will use during performances.

blocking

A pattern of pre-arranged, precise onstage movements or positions, other than dance choreography, used by performers in a performance. Blocking is the primary method used to eliminate or mitigate hazards in the live production industry.

choreographer

A person who composes, directs, or creates dance works.

choreography

Pre-arranged dance steps, spacial patterns, and groupings that make up a dance composition.

designer

A person who designs production components such as costumes, lighting, makeup, scenery, or sounds.

director

A person who has the overall creative authority for a performance or production.

fly

1. The rigging or equipment for suspending performers or production components.
2. The movement of suspended performers or production components during a production.

fly area

Any space through which a suspended performer travels. Also called the *aerial arena*.

full body harness

Personal protective equipment designed to distribute a fall arresting force over the thighs, shoulders, and pelvis. The harness consists of connected straps to which a worker can attach a lanyard, lifeline, or other components.

lanyard

A short, flexible line of webbing or synthetic or wire rope that is used to secure a safety belt or full body harness to a lifeline or anchor.

lifeline

A synthetic or wire rope used to attach a worker's personal fall protection system to one or more anchors.

mitigate

To alleviate, lessen, or decrease.

notes

The changes, corrections, or comments given to performers and technicians following a rehearsal or performance.

operator

A qualified, trained worker who is responsible for operating a piece of equipment.

performer

A performing artist, including actors, dancers, musicians, and singers.

performer flying

Operator-controlled raising or lowering of a performer who is suspended by rope or cable, where the performer has little or no control over the speed and direction of travel. Compare with *aerial stunts*.

personal fall protection system

An individual worker's fall protection system, consisting of:

- a safety belt or full body harness
- a lanyard
- a lifeline
- other connecting hardware used to secure the worker to an anchor or a horizontal lifeline system

practicable

Reasonably capable of being done.

production

1. The preparation and delivery of a performance, including all its associated activities.
2. The performance event itself.

production manager

A person who oversees all production elements.

qualified

According to the Regulation, “being knowledgeable of the work, the hazards involved and the means to control the hazards, by reason of education, training, experience or a combination thereof.”

Regulation, the

The Occupational Health and Safety Regulation, published by the Workers’ Compensation Board of British Columbia.

rehearsal

Paid or unpaid time used by performers and technicians to prepare for a performance.

safety belt

A body support device consisting of a strap with a means for securing it around the waist and attaching it to other fall protection components.

spacing

Rehearsal devoted to blocking choreography within a performance space, taking into account entrances, exits, crossovers, and other performance concerns.

stage manager

A person who directs the sequence of stage events during rehearsals and performances.

swing-fall hazard

The risk of swinging and colliding with an object following a fall when connected to a lanyard or lifeline that runs at an angle off vertical.

technical director

A person who ensures the smooth operation of a production’s technical aspects.

technical rehearsals

Onstage rehearsals, including cue-to-cues, dry runs, tech runs, and dress rehearsals.

unusual risk of injury

A risk of injury greater than that of falling on a flat surface. For example, working at heights above operating machinery, glass, or water presents unusual risk of injury.

venue

A performance location, including theatres, other buildings, and outdoor sites.

Appendix B: Core WCB requirements for working at heights

The most relevant sections of the Regulation that apply to working at heights in the performing arts industry are listed below. Please note that fall protection requirements appear throughout the Regulation; the sections listed below are simply the core requirements.

Topic	Location in Regulation
Work Area Guards and Handrails	Sections 4.54 – 4.63
Personal Protective Clothing and Equipment – General Requirements	Sections 8.2 – 8.3, 8.7 – 8.9
Safety Headgear	Section 8.11
Footwear	Sections 8.22 – 8.23
Fall Protection	Part 11
Ladders	Sections 13.1 – 13.14
Scaffolds	Sections 13.15 – 13.92
Elevating Work Platforms	Sections 13.103 – 13.122
Safe Work Areas and Safe Access	Sections 20.4 – 20.11
Roof Work	Sections 20.73 – 20.77
Demolition	Sections 20.111 – 20.121
Evacuation and Rescue	Part 32

Appendix C: Resources

This appendix provides information on:

- SHAPE resources
- WCB of B.C. resources
- Other organizations
- Other publications

SHAPE resources

In addition to distributing general WCB materials, SHAPE (Safety and Health in Arts Production and Entertainment) offers resources specific to the arts production and entertainment industries. Many of these industry-specific manuals, pamphlets, safety bulletins, and forms are free to B.C. workers and employers. SHAPE also maintains a video lending library.

To order or borrow health and safety publications or videos, or for more information about ongoing safety courses in First Aid, WHMIS, and Safety Awareness, contact:

SHAPE (Safety and Health in Arts Production and Entertainment)

Suite 280 – 1385 West 8th Avenue

Vancouver, BC V6H 3V9

Tel: 604 733-4682 in the Lower Mainland

1 888 229-1455, toll-free in B.C.

Fax: 604 733-4692

E-mail: info@shape.bc.ca

Web: www.shape.bc.ca

WCB of B.C. resources

The Workers' Compensation Board of British Columbia is one of North America's leading publishers of workplace health and safety materials. Many WCB brochures, posters, and videos are free to B.C. workers and employers. Videos that are not free can be borrowed or purchased.

The Occupational Health and Safety Regulation and many other WCB publications are available on the Internet. Visit the WCB Web site at www.worksafebc.com.

To order the WCB Publications Catalogue, WCB Video Catalogue, or any of the publications or videos listed in the catalogues, contact:

Publications and Videos Section
Workers' Compensation Board of B.C.
PO Box 5350 Stn Terminal
Vancouver, BC V6B 5L5
Tel: 604 276-3068 in the Lower Mainland
1 800 661-2112, local 3068, toll-free in B.C.
Fax: 604 279-7406
E-mail: pubvid@wcb.bc.ca

Other organizations

Entertainment Services and Technology Association (ESTA)
875 Sixth Avenue, Suite 1005
New York, NY 10001 USA
Tel: 212 244-1505
Fax: 212 244-1502
E-mail: info@esta.org
Web: www.esta.org

North American Association of Flying Effects Directors (NAAFED)
Delbert Hall
12 Spring Knoll Court
Johnson City, TN 37601 USA
Tel: 423 439-7912
Fax: 423 439-4645
E-mail: halld@flyingfx.com

United States Institute for Theatre Technology (USITT)

6443 Ridings Road

Syracuse, NY 13206-1111 USA

Tel: 1 800 938-7488 (800 93USITT),
toll-free in North America

Fax: 1 866 398-7488 (866 FXUSITT)

E-mail: info@office.usitt.org

Web: www.usitt.org

Other publications

"Fall Protection for Arena Shows" in *Theatre Design and Technology* 32,
No. 1 (winter 1996): 13 – 25, 64 – 65

Rocky Paulson and Steven Nelson

United States Institute for Theatre Technology (USITT)

Web: www.usitt.org/tdt.index

(for further contact information, see "Other Organizations")

Health and Safety Guidelines for the Nova Scotia Film and Video Production Industry

Nova Scotia Environment and Labour

Occupational Health and Safety Division

5151 Terminal Road

Halifax, NS B3J 2T8

Tel: 902 424-5400

1 800 952-2687 (1 800 9-LABOUR), toll-free

Fax: 902 424-3239

E-mail: labrohs@gov.ns.ca

Web: www.gov.ns.ca/enla/ohs/

Introduction to Fall Protection, 3rd ed.

J. Nigel Ellis

American Society of Safety Engineers (ASSE)

Customer Service

1800 East Oakton Street

Des Plaines, IL 60018 USA

Tel: 847 699-2929

Fax: 847 768-3434

847 296-3769

E-mail: customerservice@asse.org

Web: www.asse.org

Safety Guidelines for the Live Performance Industry in Ontario, 2nd ed.

Ontario Ministry of Labour

Publications Section

400 University Avenue, 7th Floor

Toronto, ON M7A 1T7

Tel: 416 326-7731

1 800 268-8013, local 6-7731, toll-free in Ontario

Fax: 416 326-7745

E-mail: pubsale@gov.on.ca

Web: www.gov.on.ca/LAB/main.htm

Appendix D: Sample rehearsal process

The following example — a staged sword fight — is adapted from *A Regulation Revue* (Workers' Compensation Board of British Columbia).

Safety measures

Safety measures include the following:

- Design and, if necessary, modify scenery to facilitate the desired blocking and to eliminate slipping and tripping hazards.
- Choose or construct the weapons with the fight actions in mind.
- Design and construct costumes to allow the necessary free movements and perhaps to provide protection if an actual hit occurs.
- Consider footwear and the planned floor surface to eliminate slipping hazards.
- Design lighting to give the appropriate atmosphere while eliminating possible glare and visibility problems for the performers.

In rehearsal, the entire duel sequence is choreographed by a specialist fight director experienced in staging such scenes. The fight director trains the performers in every required movement and directs the gradual assembly of separate movements into a continuous sequence that is repeated many times, first at reduced speed and gradually increasing to performance speed.

Offstage rehearsal

Because much of the rehearsal takes place before the actual stage set is available, the fight director discusses the duel with the performers using a model of the set for illustration. Rehearsal might require that some crucial movements be practised on mocked-up scenic units or actual units still in the shop. In addition, unusual costume pieces (for example, helmets or armour) might be used in the rehearsal hall to forestall problems. During rehearsals, the stage manager records factors that might affect performer safety and brings them to production meetings for discussion if necessary. Such factors include:

- newly created actions
- changed blocking
- different props

Crew rehearsal

At the theatre, set-up of the scenery, lighting, and other elements occurs without the performers. The stage crew rehearses scene shifts to confirm their feasibility and safety. Factors considered include:

- speeds and sequences of wagon, fly, and people movements
- the provision of adequate work lights, spike marks, and safety zones if needed for performers and crew
- the assignment of responsibility to individuals for ensuring that critical actions have been properly accomplished before they allow sequences to proceed

Establishing reliable communication systems and protocols is particularly important during these dry-run technical rehearsals.

Performer rehearsal

Upon moving into the theatre the performers are directed to familiarize themselves with the scenery and do a dry run of the duel sequence with the fight director to identify any unexpected hazards. The action is modified to accommodate any problems encountered.

Once the basic safety of the on-stage action is confirmed, the performers work through the duel again, gradually increasing the pace to performance tempo. This occurs in full light. If any other cast members will be on stage during the fight, they walk through the sequence to ensure that their planned moves will be safe. If any scene change is associated with the duel, the performers involved are shown the sequence and walk through it in full light.

Next, the performers are shown the planned performance lighting and walk through the sequence again to discover potential problems. Modifications to the lighting or to the shift sequence are made if necessary.

Full rehearsal

When all these steps are completed, the performers perform the duel at full speed in actual costume and lighting conditions. If no new problems are found, the fight scene is “set,” and from then on is performed precisely the same way every time. It is normal for performers in such a scene to

practise the entire fight together before every performance. This helps them develop a “performance pattern” that allows the safe repetition of the action every night.

It would be misleading to suggest that every scene is rehearsed as intensively as this example, but the process is applied to all difficult or potentially hazardous actions (for example, climbing a “tree,” staging a trip-and-fall, riding a bicycle, or smashing crockery), as necessary to achieve safe and repeatable blocking.

Since it is never known before rehearsal exactly what actions will be developed for a particular production, safety depends not on narrowly specific rules but on the application of safe work procedures and on the rehearsal process itself.

Performers are trained and required to do exactly the same moves each night and their performances are monitored by the stage manager and the stage manager’s assistants. Timing that is off by even a few seconds or blocking that differs by inches from normal may be cause for notes and perhaps for special rehearsals. Such attention to detail has allowed the industry to remain creative and innovative while maintaining an enviable safety record.

Appendix E: Sample safe development process

The following example is adapted from *A Regulation Revue* (Workers' Compensation Board of British Columbia).

Artistic concept and planning

Most new productions of plays, musicals, dances, or operas require scenery that is specially designed and custom-built and that will be destroyed at the end of the run.

The scene designer agrees on an artistic concept with the director and, working from that concept, produces sketches, models, and, eventually, detailed drawings of the various scenic units. This process often requires weeks or months to complete. At each step the design is examined, discussed, and probably modified to accommodate the director's increasingly specific requirements.

Issues considered at a design conference include:

- where on the set each scene will be played
- the type of activity and the number of performers to be accommodated in each area
- entrance and exit routes for performers
- necessary scene changes, including allowable time, the methods of shifting, backstage storage, probable lighting, and performer involvement

All of the above planning is done before rehearsals begin.

Set design

Before starting scenery construction, the designer confers with the technical director about the set design. In particular, they address issues of safety, feasibility, construction methods, crew requirements, cost, and scheduling. If any specialists will be involved in the show (for example, choreographers, fight directors, or pyrotechnicians), they will be consulted to ensure that their concerns are known and can be accommodated. Once the technical director understands exactly how each scenic unit will be used and who will use each unit, the technical director can decide on the

appropriate construction methods and materials. Working drawings are made and the scenery shop commences construction, a process that typically requires three to six weeks.

The objective of the safe development process is the creation of scenic units that, while meeting the designer's aesthetic criteria, are appropriately constructed and demonstrated to be safe for use by performers and crew for the specific requirements of the performance. To this end, scenic units that involve any of the following undergo incremental construction and testing in the shop:

- non-standard construction methods or materials
- moveability
- unusually hard usage by performers
- special effects devices

Rehearsals

Rehearsals generally take place during the same period as scenery construction. Rehearsals always involve the development of new ideas for stage business, props, and blocking. One of the stage manager's most important functions is to record these items and to notify the designers and shops that may be affected. All potential changes are discussed at regular production meetings to ensure that everyone (the director, designers, stage manager, and technical director) understands the implications of each change. Modifications are only accepted if they can be made safely and within time and budget constraints. If an idea is unavoidably hazardous, it is rejected at this time.

Example: Abstract tree constructed of steel tubing

The following is an example of the safe development process. In this case, the procedure involves an abstract tree of steel tubing that will be climbed by three performers.

1. Confirm in detail with the director what action is wanted:
 - How many performers at a time will be on the tree?
 - How long will they be up the tree?
 - How high will they climb?

- What will they stand on?
 - What shoes will they wear?
 - How fast must they get up and down?
 - Is the tree supposed to sway or be rigid?
2. Purchase and test steel tubing of different diameters and wall thicknesses.
 3. Agree with the designer on the diameters that will be strong enough while retaining the desired look.
 4. Discuss with the designer supplementary supports that may be necessary:
 - What is the size of the tree base?
 - What will the attachment to the floor be?
 - Will there be hidden diagonal braces from the floor? Support cables from above?
 - What will the attachment to the building structure be?
 5. Construct the basic tree shape, beginning with the strongest tubing, which will be climbed, then adding non-functional decorative elements.
 6. Plan the sequence of steps each performer will use to climb to his or her perch. Consult with the performers.
 7. Test the tree in the shop by subjecting it to gradually increasing loads and movements that are more forceful than those the performers will make. Make sure it is adequately resistant to factors such as overloads, sideways loading, and torque. Inspect it for flaws such as deformation or cracking.
 8. Place footholds and handholds temporarily and test them. If tests are successful, have the performers test their placement one at a time.
 9. Permanently attach footholds and handholds.
 10. If possible, have performers test again in the shop to confirm that they can remain comfortably in the tree for the necessary length of time. If a foothold is too small, for example, it may hurt a performer's feet and will require the addition of a larger flat surface.
 11. When the set is assembled on stage, have the head carpenter and the technical director inspect it and confirm that it is properly set up and supported. Have them test it again before performers use it.

12. Allow time for the performers to practise climbing the tree until they are comfortable with their moves. If there are difficulties, have the performers, director, and technical director confer. If a minor physical modification to the tree will solve the problem, have the changes made. If modification is not possible, have the director change the action to eliminate the problem.
13. During the run of the show, have the tree inspected before each performance and ask performers to report any problems or concerns to the stage manager.

Appendix F: Forms

This appendix includes the following forms:

- Risk assessment checklist
- Fall protection plan
- Information sheet for worker health and safety representatives

Risk assessment checklist

Date: _____ Production or event: _____

Location: _____ Completed by: _____

Use this risk assessment checklist to help you identify activities in your production or event that involve working at heights, identify the risks involved with those activities, and determine the safe work practices you will use to eliminate or mitigate those risks.

1. *Activities* — Check each type of activity that will involve working at heights during the production. Think through the production both chronologically and by department.
2. *Possible Risks* — Check possible risks for each of the activities you have identified.
3. *Refer to* — Read the safe work practices (in Part 3 of this guide) that correspond to the activities and risks you have identified. The safe work practices will provide you with information that will help you eliminate or mitigate risks.

When working with performers, follow standard WCB requirements whenever practicable. If performance requirements make standard fall protection methods impracticable, follow the guidelines in “Safe Work Practices 2: The Rehearsal Process” and “Safe Work Practices 3: Safe Development of Production Components.”



Note: Risks marked * require a written fall protection plan.

Activities	Possible Risks	Refer to
<input type="checkbox"/> Performers working at heights during rehearsal or performance	<input type="checkbox"/> Limited rehearsal time <input type="checkbox"/> Limited development time <input type="checkbox"/> Other	Safe Work Practices 2: The Rehearsal Process, page 26
<input type="checkbox"/> Constructing custom scenery or costumes that do not meet WCB requirements for working at heights	<input type="checkbox"/> Limited rehearsal time <input type="checkbox"/> Limited development time <input type="checkbox"/> Other	Safe Work Practices 3: Safe Development of Production Components, page 29
Working near edges, including: <input type="checkbox"/> stages <input type="checkbox"/> catwalks <input type="checkbox"/> scaffolds <input type="checkbox"/> balconies <input type="checkbox"/> floor openings (pits or traps) <input type="checkbox"/> window openings <input type="checkbox"/> work platforms	<input type="checkbox"/> *performers near any edges <input type="checkbox"/> *technicians near edges at heights of 3 m (10 ft.) or more, or where falls from a lesser height could involve unusual risk of injury <input type="checkbox"/> unguarded edges during set-up and strike or during performances <input type="checkbox"/> low light conditions <input type="checkbox"/> *nonconforming guardrails at venue or on scenery <input type="checkbox"/> *use of floor openings (pits or traps) <input type="checkbox"/> *use of window openings for access or egress <input type="checkbox"/> other	Safe Work Practices 2: The Rehearsal Process, page 26 Safe Work Practices 4: Unguarded Edges, page 31

Activities	Possible Risks	Refer to
<p>Working with ladders, including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> portable ladders (straight ladders, extension ladders, A-frame ladders, and stepladders) <input type="checkbox"/> wheeled A-frame ladders <input type="checkbox"/> permanent ladders (access and escape ladders) 	<ul style="list-style-type: none"> <input type="checkbox"/> performers on any ladder <input type="checkbox"/> *technicians on portable ladders at heights of 7.5 m (25 ft.) or more, or where falls from a lesser height could involve unusual risk of injury <input type="checkbox"/> *technicians on permanent ladders at heights of 3 m (10 ft.) or more, or where falls from a lesser height could involve unusual risk of injury <input type="checkbox"/> work where three-point contact is not practicable <input type="checkbox"/> low light conditions <input type="checkbox"/> moving technicians on wheeled A-frame ladders <input type="checkbox"/> handling heavy, awkward, or unusual equipment or materials <input type="checkbox"/> other 	<p>Safe Work Practices 2: The Rehearsal Process, page 26</p> <p>Safe Work Practices 5: Ladders, page 34</p> <p>Safe Work Practices 8: Communication Protocols, page 46</p>

Activities	Possible Risks	Refer to
<p>Working with scaffolds, including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> standard industrial scaffolds <input type="checkbox"/> modified industrial scaffolds <input type="checkbox"/> custom fabricated scaffolds 	<ul style="list-style-type: none"> <input type="checkbox"/> *performers on any scaffolds <input type="checkbox"/> assembly and disassembly of scaffolds <input type="checkbox"/> *technicians on scaffolds at heights of 7.5 m (25 ft.) or more, or where falls from a lesser height could involve unusual risk of injury <input type="checkbox"/> moving technicians on wheeled scaffolds <input type="checkbox"/> handling heavy, awkward, or unusual equipment or materials <input type="checkbox"/> other 	<p>Safe Work Practices 2: The Rehearsal Process, page 26</p> <p>Safe Work Practices 6: Scaffolds, page 39</p> <p>Safe Work Practices 8: Communication Protocols, page 46</p>
<p>Working with lifts, including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> bucket lifts <input type="checkbox"/> scissor lifts <input type="checkbox"/> boom lifts 	<ul style="list-style-type: none"> <input type="checkbox"/> *performers on any lifts <input type="checkbox"/> *using boom lifts <input type="checkbox"/> operating lifts on sloped or uneven ground <input type="checkbox"/> moving technicians elevated in lifts <input type="checkbox"/> handling heavy, awkward, or unusual equipment or materials <input type="checkbox"/> inappropriate use of fall protection equipment, including guardrails, anchor points, harnesses, and lanyards <input type="checkbox"/> other 	<p>Safe Work Practices 2: The Rehearsal Process, page 26</p> <p>Safe Work Practices 7: Lifts, page 42</p> <p>Safe Work Practices 8: Communication Protocols, page 46</p>

Activities	Possible Risks	Refer to
<p>Working on high steel or at an extreme angle (a slope ratio of 8 vertical to 12 horizontal or more), including:</p> <ul style="list-style-type: none"> <input type="checkbox"/> venue structural trusses <input type="checkbox"/> temporary truss systems <input type="checkbox"/> lighting grids <input type="checkbox"/> roofs or raked stages <input type="checkbox"/> interior or exterior walls 	<ul style="list-style-type: none"> <input type="checkbox"/> *performers on high steel or at an extreme angle <input type="checkbox"/> *technicians on high steel or at an extreme angle <input type="checkbox"/> other 	<p>Safe Work Practices 2: The Rehearsal Process, page 26</p> <p>Safe Work Practices 9: High Steel, page 47</p>
<p>General hazards while working at heights</p>	<ul style="list-style-type: none"> <input type="checkbox"/> falling objects <input type="checkbox"/> low light levels <input type="checkbox"/> *slippery or unstable surfaces <input type="checkbox"/> *working alone <input type="checkbox"/> high voltage <input type="checkbox"/> *multiple crews working simultaneously during set-up or strike <input type="checkbox"/> *adverse weather (for example, high or gusting winds, heavy rain or snow, or extreme heat) <input type="checkbox"/> new or inexperienced crew, including students, apprentices, and volunteers <input type="checkbox"/> use of rental equipment <input type="checkbox"/> *custom footwear or equipment, including stilts, in-line skates, and unicycles <input type="checkbox"/> other 	<p>Safe Work Practices 1: General Safety Guidelines, page 24</p> <p>Safe Work Practices 2: The Rehearsal Process, page 26</p>

Fall protection plan

Date: _____ Production or event: _____

Location: _____ Completed by: _____

Designated health and safety coordinator: _____

1. In the left column, list risks identified in the risk assessment checklist. In the right column, list the methods you will use to eliminate or mitigate each risk. Attach additional pages if necessary.

Identified risk (including location)	Methods to eliminate or mitigate the risk

- 2a. If you will be using a fall protection system, describe procedures for assembling, installing, maintaining, inspecting, and disassembling the system or equipment. List all components. Attach copies of manufacturers' instructions if possible. Attach additional pages if necessary.

- 2b. Describe how you would rescue workers who fell while using the fall protection system and were suspended by it or a safety net, but unable to rescue themselves. Attach additional pages if necessary.

- [illegible]

Information sheet for worker health and safety representatives

Thank you for taking on the role of worker health and safety representative. Your basic responsibilities are as follows:

- Identify situations that might be unhealthy or unsafe for workers.
- Recommend ways to eliminate or control potential hazards.
- Recommend ways to improve the production's health and safety program and the overall work environment.
- Consider and respond to health and safety complaints or recommendations from the cast and crew.
- Promote safe work practices.
- Make sure regular workplace inspections are carried out.
- Make sure incidents are investigated.
- Participate in workplace inspections and incident investigations.
- Make sure that all aspects of the production meet WCB requirements.

If you are not satisfied with your employer's response to a health and safety issue, you can contact SHAPE or the WCB.

SHAPE (Safety and Health in Arts Production and Entertainment)
Suite 280 – 1385 West 8th Avenue
Vancouver, BC V6H 3V9
Tel: 604 733-4682 in the Lower Mainland
1 888 229-1455, toll-free in B.C.
Fax: 604 733-4692
Web: www.shape.bc.ca

Workers' Compensation Board of B.C.
PO Box 5350 Stn Terminal
Vancouver, BC V6B 5L5
Tel: 604 276-3136 in the Lower Mainland
1 800 661-2112, local 3136, toll-free in B.C.
Fax: 604 276-3106
Web: www.worksafebc.com

