

UC Irvine School of the Arts Working At Heights Program**Fall Protection Program Introduction**

The *UC Irvine School of the Arts Working At Heights Program* is a key component of this Unit's Injury & Illness Prevention Program as part of UCI's Safety On Site (SOS) program and supports the overall UC Policy on Management of Health, Safety and the Environment.

The Working At Heights Program is based on the most current version of ANSI/ASSE Z359.2 - Minimum Requirements for a Comprehensive Managed Fall Protection Program. This document will detail all known fall hazards within the facility along with equipment and procedures to work around these hazards safely. Details will include equipment usage, authorized personnel and rescue procedures.

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Definitions (ANSI Z359.0)

Authorized Person. A person assigned by the employer to perform duties at a location where the person will be exposed to a fall hazard. An authorized person is required to receive training and to periodically demonstrate the ability to safely use the appropriate fall protection equipment.

Certified Anchorage. An anchorage for fall arrest, positioning, restraint, or rescue systems that a qualified person certifies to be capable of supporting the potential fall forces that could be encountered during a fall or that meet the criteria for a certified anchorage prescribed in this standard.

Competent Person. An individual designated by the employer to be responsible for the immediate supervision, implementation, and monitoring of the employer's managed fall protection program, who, through training and knowledge, is capable of identifying, evaluating, and addressing existing and potential fall hazards, and who has the employer's authority to take prompt corrective action with regard to such hazards.

Fall Protection. Any equipment, device or system that prevents an accidental fall from elevation or that mitigates the effect of such a fall.

Free Fall Distance. The vertical distance traveled during a fall, measured from the onset of a fall from a walking working surface to the point at which the fall protection system begins to arrest the fall.

Lanyard. A component consisting of a flexible rope, wire rope, or strap, which typically has a connector at each end for connecting to the body support and to a fall arrester, energy absorber, anchorage connector, or anchorage.

Maximum Arrest Force. The peak force measured by the test instrumentation during arrest of the test weight in the dynamic tests set forth in these standards.

Non-Certified Fall Arrest Anchorage. A fall arrest anchorage that a competent person can judge to be capable of supporting the predetermined anchorage forces as prescribed in these standards. Non-certified anchorages typically consist of unquestionably strong elements of a structure.

Program Administrator. A person authorized by their employer to be responsible for managing the employer's fall protection program.

Qualified Person. A person with a recognized degree or professional certificate and with extensive knowledge, training, and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating and specifying fall protection and rescue systems to the extent required by these standards.

Rescue. The process of removing a person from danger, harm, or confinement to a safe location.

Self-Retracting Device (SRD). A device that contains a drum wound line that automatically locks at the onset of a fall to arrest the user, but that automatically pays out from and retracts onto the drum during normal movement of the person to whom the line is attached. After onset of a fall, the device automatically locks the drum and arrests the fall. Self-retracting devices include self-retracting lanyards (SRLs) and self-retracting lanyards with integral rescue capability (SRL-Rs).

Shall. The word "shall" is to be understood as denoting a mandatory requirement.

Should. The word “should” denotes a recommendation.

Swing Fall. A pendulum-like motion that occurs during and/or after a vertical fall. A swing fall results when an authorized person begins a fall from a position that is located horizontally away from a fixed anchorage.

Total Fall Distance. The total vertical distance a person falls, measured from the onset of a fall to the point where the person comes to rest after the fall is stopped.

Webbing. A narrow woven fabric with selvage edges and continuous filament yarns made from light and heat resistant fibers.

Roles and Responsibilities

- Program Administrator
 - The program administrator shall be responsible for development, implementation, monitoring, and evaluation of the managed fall protection program. These responsibilities shall include, but are not limited to, identification of new fall hazards, creating new and auditing existing procedures to protect workers from fall hazards, scheduling and overseeing inspections and training as appropriate, and ensuring the program meets current and local codes and regulations pertaining to fall protection.
- Competent Persons
 - The competent person shall be responsible for the immediate supervision, implementation, and monitoring of the managed fall protection program. These responsibilities include overseeing the safe use of the fall protection equipment in accordance with this program and current and local codes and regulations. They shall setup and supervise improvised anchorages, carry out scheduled inspections as needed, evaluate authorized users, and carry out rescue procedures as laid out in this program.
- Authorized Persons
 - Authorized Persons shall be responsible for the proper use, inspection, maintenance and care of fall protection equipment in accordance with this program and their training. Authorized persons shall notify the competent person of any fall protection equipment defects or damage. They may connect and disconnect to and from anchorages as laid out by this program or as directed by a competent person, but may not setup or choose the anchorage themselves.

See Appendix 1 for a listing of the Program Administrator, Competent Person(s) and Authorized Persons.

Training requirements

Documented training must be completed by any worker prior to using an active fall protection system. At a minimum, training shall be done in accordance with the timetable below.

- Ladder Safety: Every 3 years
- Aerial Lift Safety: Every 3 years

- Fall Protection Authorized User: Every 3 years
- Scaffold Safety: Contact EH&S at safety@uci.edu or at x46200
- Fall Protection Competent Persons: Every 2 years

General Rescue Guidelines

In the event of a fall arrest, the following steps shall be followed. Rescue details related to specific fall hazard locations and operations are covered under the Fall Hazard Procedures section.

- Call 911 from any phone, including campus phones
- Assess work area of further danger
- Attempt to establish verbal communication with the fallen worker
- If the fallen worker is conscious and able, instruct them to perform self-rescue
 - If leg straps are available on the harness, they can be used to relieve harness pressure to provide more time for self or assisted rescue. Workers should be trained to “pump” their legs frequently to activate their leg muscles. Instruct them to do so while preparing for self or assisted rescue.
 - If the worker is still at the level of the work area, they may pull themselves back onto the work platform
 - If the worker is adjacent to a ladder, they may regain footing on the ladder and ascend/descend to the nearest work platform. (Note: extra caution should be taken as the fall arrest mechanism will have been deployed and may not protect against a second fall)
- If the fallen worker is not conscious, or is not able to perform self-rescue, wait for Orange County Fire Authority (OCFA) to respond for rescue.
- Once the worker is safely on the ground or back on the work platform, wait for paramedics to evaluate the worker before attempting to move them.
- All fall protection equipment involved in the fall shall be removed from service immediately. Anchorages and SRL’s shall be tagged out of service until replaced or recertified by a qualified person. All incidents shall be reported and investigated in accordance with UCI’s Injury & Illness Prevention Program policies.

Identify, Evaluate and Control Fall Hazards

Use the Fall Hazard Survey Report to identify, evaluate and determine appropriate control measures for facility fall hazards.

- Eliminate the Fall Hazard
 - If possible eliminate or engineer out the fall hazard such that no hazard exists at all. Examples of this include lowering equipment down to floor level for maintenance or repair.
- Passive Protection to the Fall Hazard
 - If the hazard cannot be eliminated, prevent employees from being exposed to the hazard if possible. Examples of this include installing guardrails and access controls.

- Protect from the Fall Hazard via Fall Protection System
 - If the employee must be exposed to the hazard and there is no passive fall protection system suitable for the exposure, use an active fall protection system and equipment to protect the employee in the event of a fall. This includes the use of harnesses, lanyards, SRLs, and other fall protection equipment.

Cal/OSHA General Industry Requirements

Cal/OSHA specifies the following in their General Industry Orders:

3210. Guardrails at Elevated Locations

*(a) Buildings. Guardrails shall be provided on all open sides of unenclosed elevated work locations, such as roof openings, open and glazed sides of landings, balconies or porches, platforms, runways, ramps or **working levels more than 30 inches above the floor**, ground, or other working areas of building as defined in Section 3207 of the general Industry Safety Orders. Where overhead clearance prohibits installation of a 42-inch guardrail, a lower rail or rail shall be installed. The railing shall be provided with a toe board where the platform, runway, or ramp is 6 feet or more above places where employees normally work or pass and the lack of a toe board could create a hazard from falling tools, material, or equipment.*

Exception:

9. Theatre galleries, balconies, or other such elevated seating locations, where a 42-inches railing would obstruct the sight lines, may be protected by a guardrails or other barrier of not less than 34 inches in height provided that a horizontal concave safety ledge not less than 6 inches in depth and not less than 36 inches in effective width is installed beyond the railing at the balcony floor level. The safety ledge shall be designed to carry a live load of 100 pounds per square foot.

11. Elevated locations used infrequently by employees if the employees using them are protected by a fall restraint/fall arrest system used in accordance with the requirements in Article 24 of the Construction Safety Orders.

13. On the auditorium side of a stage, raised platforms and other raised floor areas such as runways, ramps and side stages used for entertainment or presentation. At vertical openings in the performance area of stages.

*(b) Other Elevated Locations. The unprotected sides of elevated work location that are not building or building structures where an employee is **exposed to a fall of 4 feet or more** shall be provided with guardrails. Where overhead clearance prohibited installation of a 42-inches guardrail, a lower rail or rails shall be installed. The railing shall be provided with a toe board where the platform, runway, or ramp is 6 feet or more above places where employees normally work or pass and the lack of a toe board could create a hazard from falling tools, material, or equipment.*

User Equipment

- All fall protection equipment shall be manufactured and used in accordance with ANSI Z359 standards and applicable Cal/OSHA regulations. Fall protection anchorages and user equipment shall be used only for fall protection.
- All fall protection systems shall limit free fall to 6 feet, reduce arresting force to below 1800 pounds, and limit any swing fall hazards.
- All harnesses, beam straps, lanyards, and any other user equipment shall be inspected prior to use and in accordance to the manufacturer's instructions. Damaged or worn equipment shall be brought to the attention of the designated Competent Person.

Total Fall Distance

The total fall distance shall be considered prior to the use of a fall arrest system to ensure the worker will not hit the ground or any obstruction that might cause them harm during the fall. Fall distance calculations will include consideration of the following factors:

- Length of any anchorage connectors
- Total free fall distance (should not exceed 6 feet)
- Deployment of the shock absorber and deceleration distance (normally should not exceed 3.5 feet)
- Height of the worker (assume approximately 6- feet')
- Safety factor (minimum 3 feet and includes harness D-ring slide considerations)
- Always round up to the nearest foot.
- SRLs eliminate the free fall distance and therefore will have less total fall distance

Inspection

- All Authorized persons shall perform an inspection of any fall protection equipment before use.
- A Competent Person shall inspect fall protection equipment and non-certified anchorages annually in accordance with the manufacturer's instructions. The inspection shall be documented.
- A Qualified Person may provide direction to a Competent Person on the frequency and type of anchorage system inspections.
- Outside contracted experts may be utilized to perform maintenance inspections on specialized pieces of equipment in accordance with manufacturer's guidelines.

Fall Hazards – Guidelines and Procedures

UPPER LOADING RAIL

Fall Protection type: Active Fall Arrest

Capacity: One person per D-ring

Description: Lanyards attached to the upper loading rail beams in the Claire Trevor Theater.

Anchorage: Each lanyard is attached to the beam via a choke strap. This is an improvised anchor.

Connectors: Each choke strap shall have a 6 feet shock absorbing lanyard connected to it.

Assisted Rescue Procedures: If the worker is high enough that they can easily be pulled back onto the work platform, the competent person shall do so. The rescuer shall be in fall arrest equipment and tied off to the nearest suspended improvised anchor on the beam using a SRL. If it is not safe to pull the worker back onto the work platform, and the worker cannot perform self-rescue, rescue will be performed by OCFA.

Authorized Users: All workers listed in Appendix A and B are authorized to use these anchorages.

SCAFFOLDING IN THEATERS (Nixon, Little, Robert Cohen, & Smith Hall)

Fall Protection type: Active Fall Arrest

Capacity: One Person

Description: When assembling or disassembling scaffolding, active fall protection is required unless it possess a greater hazard.

Anchorage: There are designated anchorage locations on the scaffold. These are certified anchorages.

Connectors: Full body harness with a 6 foot shock absorbing lanyard.

Assisted Rescue Procedure: A competent person shall use the retrieval mechanism of the SRL to lower the worker to the next level below. The worker shall be lowered into a sitting position with most tension released from the SRL line. The worker shall remain connected to the SRL until the paramedics ask it be disconnected.

Authorized Users: All workers listed in Appendix A and B are authorized to use these anchorages.

AERIAL WORK PLATFORMS (throughout the school)

Fall Protection type: Fall Restraint

Capacity: Depends on lift model. See operator's manual for maximum capacity.

Description: Aerial work platforms are used to adjust lightening, hang scenery, etc.

Anchorage: There are anchorage locations inside the basket of the lifts. These are certified anchorages. Only one person may be connected to each anchorage.

Connectors: A non-shock absorbing lanyard with a fall restraint belt may be connected to the anchorage.

Assisted Rescue Procedure: In the event that a rescue is needed and the authorized worker cannot lower themselves to the ground with the upper controls, the nearby rescuer shall lower the lift to the ground using the lower controls.

Authorized Users: All workers listed in Appendix A and B are authorized to use these anchorages.

OVERHEAD FOCUS TRACK

Fall Protection type: Active Fall Arrest

Capacity: One Person

Description: A single person basket suspended from a track that allows the worker to pull themselves along the truss.

Anchorage: Built-in anchorage points. Only one person may be connected at a time.

Connectors: One SRL may be used with this anchorage.

Assisted Rescue Procedure: A competent person shall use the retrieval mechanism of the SRL to lower the worker to the next level below. The worker shall be lowered into a sitting position with most tension released from the SRL line. The worker shall remain connected to the SRL until the paramedics ask it be disconnected.

Authorized Users: All workers listed in Appendix A and B are authorized to use these anchorages.

60 foot VERTICAL LADDER WITH LADDER SAFETY SYSTEM

Fall Protection type: Active Fall Arrest

Capacity: One Person

Description: 60 foot vertical ladder with built-in safety system. The worker attaches himself via his front D-ring to the cable system in the ladder. In addition, the worker connects himself, via his dorsal D-ring, to the overhead SRL.

Anchorage: The built-in cable system and carabineer in the center of the ladder. This is a certified anchorage.

Connectors: In addition to the built-in safety system, one SRL of sufficient length to reach the level below shall be attached via snaphook to the dorsal D-ring of the worker's full body harness.

Assisted Rescue Procedure: In the event of a fall, the worker will still be within the ladder's railings. Help the worker up or down the ladder to the next work platform.

Authorized Users: All workers listed in Appendix A and B are authorized to use these anchorages.

Tension Grid

Fall Protection type: None.

Descriptions: Modular tension wire grid system, that provides safe access to theatrical lighting, audio cables, loudspeakers, stage rigging and effects. Located in the XMPL in the Contemporary Arts Center.

Capacity: 250lbs at any point and a maximum of 350lbs/panel (20lbs/square foot)

Inspection: Schedule periodic inspections of the tension grid with outside contracted experts in accordance with the manufacturer's instructions or at least every three **(3)** years. Remember the outside expert inspections are in addition to routine inspections conducted by Performing Arts personnel. Maintain records of all inspections and service activities.

ORCHESTRA PIT

Fall Protection type: Passive fall prevention, warning lines and ghost lighting

Descriptions: When the orchestra pits are lowered 4 feet or more below stage level a fall hazard is present.

Warning Lines: If this fall hazard is present during a work shift or while the building is not occupied warning lines may be used. The warning line shall have caution signs hung from it in a visible manner. All warning lines shall be 6 feet or more from the leading edge of the fall hazard.

Pit in Motion (engineering controls): When the pit is put into motion and the gates are removed, the pit will no longer be operable. Furthermore, when the doors below the pit are opened, the pit will not function. A third engineering control is the rubber bumper located below the stage. The bumper functions such that anything sticking out beyond it will trigger the bumper and immediately stop the pit from moving.

LADDERS

Fall Protection type: None required.

Descriptions: Worker maintains 3 points of contact at all times when climbing a ladder. Work will not be performed from the top two rungs of the ladder. Worker's belt buckle shall remain within the sides of the ladder.

Appendix 1

PRODUCTION

Program Administrator: Desirée Villarreal, desv@uci.edu

Competent Person(s): Joseph Forehand, jforehan@uci.edu

Authorized Persons (Upper Loading Rail): See List located in Building 711, Room B05

Authorized Persons (Scaffolding): See List located in Building 711, Room B05

Authorized Persons (Aerial Work Platform): See List located in Building 711, Room B05

Authorized Persons (Overhead Focus Track): See List located in Building 711, Room B05

Authorized Persons (Vertical Ladder with Ladder Safety System): See List located in Building 711, Room B05