



ENVIRONMENTAL HEALTH AND SAFETY

SCAFFOLDING PROGRAM MANUAL

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Reviewed and Revised March 2024

Status

Contact(s)	Implementation Date	Comments
EHS	July 2018	Manual created.
EHS	February 2022	Manual updated.
Alex Christy, EHS	January 2023	Manual reformatted to fit branding standards.
Cooper Decker, EHS	June 2023	Manual verified and updated to include current information.
Dylan Epperson, EHS	March 2024	Manual verified and corrected minor grammar errors.

Table of Contents

Status	2
A: INTRODUCTION	4
B: ADMINISTRATIVE ROLES	4
C: SCAFFOLD TYPES	5
D: PLATFORM AND WALKWAY REQUIREMENTS	6
E: ACCESSING SCAFFOLDS	8
F: FALL PROTECTION.....	9
G: SUPPORTING SCAFFOLDS	10
H: CONTRACTORS	11
I: TRAINING.....	12
P: DIRECTORY.....	12
APPENDIX A: DEFINITIONS	13

A: INTRODUCTION

Scaffolding is used in a wide variety of projects including new construction, routine maintenance, renovation, painting, repairing, removal, performing arts activities, and more. Scaffolding offers a safer and more comfortable work arrangement compared to leaning over edges, stretching overhead, and working from ladders. Scaffolding provides employees safe access to work locations, level and stable working platforms, and temporary storage for tools and materials for performing immediate tasks. Scaffolding accidents mainly involve personnel falls and falling materials caused by equipment failure, incorrect operating procedures, and environmental conditions. Additionally, scaffolding overloading is a frequent single cause of major scaffold failure.

B: ADMINISTRATIVE ROLES

ENVIRONMENTAL HEALTH AND SAFETY

The specific responsibility for developing and implementing Oklahoma State University (OSU) programs for health and safety resides with the Environmental Health and Safety (EHS) department. In fulfillment of this responsibility, EHS has prepared the Oklahoma State University Scaffolding Program Manual and assists other departments in the development and implementation of scaffolding procedures and Scaffolding Safety Program instructions for their areas.

FACILITIES MANAGEMENT

Facilities Management (FM) FM supervisors are responsible for ensuring their employees are properly trained to do the jobs they are sent to do. They will also identify the employees affected by this scaffolding safety policy and procedure. FM Zone Managers will coordinate the required training for the affected employees. No FM employee shall be sent on a job that potentially involves work on scaffolding unless they have been properly trained in scaffolding procedures.

DEPARTMENTS

Each department that requires employees to use scaffolds must designate a “competent person” to oversee erecting, securing, and dismantling of scaffolds. The competent person must understand the rules, and regulations as they pertain to the scaffold they oversee, as well as conduct scaffold inspections and manage daily activities involving scaffold use.

MANAGERS AND SUPERVISORS

Managers and supervisors play a key role in the implementation of the Scaffolding Program. Managers will ensure adequate funds are budgeted and available for the purchase/rental of scaffolds in their areas. They will also identify the employees whose jobs require the use of scaffolding. FM Managers will also ensure that all personnel required to participate in the scaffolding program are trained prior to assignment; that proper safety equipment required for the scaffold is made available to personnel; and that all provisions of the program are followed.

PERSONNEL

Personnel are responsible for observing all practices and procedures contained in the Scaffolding Program Manual, other general safety practices, attending designated training sessions, and reporting hazardous or unsafe conditions to their supervisor or to EHS. Employees will assist with inspections as requested. No work will take place on a platform until it has been inspected by a competent person before every use.

PROGRAM REVIEW

EHS will review the Scaffolding Program Manual annually. If revisions are needed, the changes shall be made, and employees trained on the revisions.

STANDARD OPERATING PROCEDURES

Standard operating procedures (SOP) describe the method(s) that will be used to complete a task or operation. Departments with scaffolds must develop SOPs and incorporate them into this manual to complete their Scaffolding Program.

Departments must develop procedures regarding the items below to make the program specific to their areas:

- General requirements
- Erecting of scaffolding
- Pre-inspection of erected scaffolding
- Final inspection of erected scaffolding
- Dismantling of scaffolding
- Training
- Supporting structure

RECORDKEEPING

Facilities Management departments must keep records concerning scaffolding inspections, inventories, and training for each department.

C: SCAFFOLD TYPES

Scaffolding, also called scaffold or staging, is a temporary structure used to support a work crew and materials to aid in the construction, maintenance, and repair of buildings, bridges, and all other man-made structures. Scaffolds are widely used on sites to gain access to heights and areas that would otherwise be difficult to reach. Unsafe scaffolding has the potential to result in death or serious injury.

SELF-SUPPORTING SCAFFOLDS

One or more working platforms supported from below by outriggers, brackets, poles, legs, uprights, posts, frames, or similar supports. These types of self-supporting scaffolds used at OSU include:

- **FABRICATED FRAME**

The most common type of scaffold because they are versatile, economical, and easy to use. They are frequently used in one or two tiers by residential contractors, painters, etc., but their modular frames can also be stacked several stories high for use on large-scale construction jobs.

- **MOBILE SCAFFOLDING**

A type of supported scaffold set on wheels or casters. They are designed to be easily moved and are commonly used for things like painting and plastering, where workers must frequently change positions.

- **TUBE & COUPLER (CLAMP) SCAFFOLDING**

A type of scaffold with platforms supported by tubing, and erected with coupling devices connecting uprights, braces, bearers, and runners. This type of scaffold is frequently used where heavy loads need to be carried or where surfaces with irregular dimensions are needed.

SUSPENDED SCAFFOLDS

Suspended Scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure. These types of suspended scaffolds could be used at OSU:

- **BOATSWAIN'S CHAIR**
A single-point adjustable suspension scaffold consisting of a seat or sling designed to support one employee in a sitting position.
- **FLOAT (SHIP) SCAFFOLD**
A suspension scaffold consisting of a braced platform resting on two parallel bearers and hung from overhead supports by ropes of fixed length.
- **MULTIPOINT ADJUSTABLE SUSPENSION SCAFFOLD**
A suspension scaffold consisting of a platform which is suspended by more than two ropes from overhead supports and equipped with means to raise and lower the platform to desired work levels.

EHS and FM shall survey each Zone to determine the types of scaffolding being used by each department. A list of all types of scaffolding will be maintained by EHS and FM. Upon request, EHS will assist other OSU entities in their determination of what type of scaffolding is required to meet the needs of that department.

D: PLATFORM AND WALKWAY REQUIREMENTS

PLANKING

Except when used only as a walkway, the platform is the work area of a scaffold. All scaffolds must be fully planked or decked between front uprights and guardrail supports. Scaffold and scaffold components, including platforms, must be capable of supporting, without failure, its own weight and at least 4 times the maximum intended load applied or transmitted to it.

No gaps greater than 1 inch are permitted between adjacent planks or deck units, or between the platform and the uprights, unless the competent person can demonstrate that the wider space is necessary. On those occasions, the gap needs to be as small as possible and must not exceed 9 ½ inches.

Wooden planking must not be covered with opaque finishes, except for edges marked for identification. Platforms may be coated periodically with wood preservatives, fire retardants, and slip-resistant finishes, provided they do not obscure the top or bottom wood surfaces. Debris shall not be allowed to accumulate on platforms.

Scaffold platforms and walkways must be at least 18 inches wide, unless they are used in areas the competent person deems too narrow, requiring the use of smaller planking. On those occasions, the platforms must be as wide as feasible, and fall protection must be provided.

Nothing that could cause a slip, trip, or fall (i.e. tools, scrap material, chemicals, snow, ice, etc.) is allowed to accumulate on the work platform.

FALLING OBJECT PROTECTION

In addition to wearing hardhats, each employee shall be protected from falling objects through the installation of toe boards, screens, or guardrail systems or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect falling objects. When falling objects are too large to be contained or deflected, the employer shall place the potential falling objects away from the edge of the surface from which they could fall and shall secure those materials if necessary.

Where there is danger of falling objects, the area below the scaffold shall be barricaded and employees shall not enter the hazard area; or a toe board shall be erected along the edge of the platform more than 10 feet above lower levels for a distance sufficient to protect employees below.

Toe boards shall have the capability to withstand without failure a force of 50 pounds applied in a downward or horizontal direction at any point along the toe board and shall be at least three- and one-half inches high from the top edge of the toe board to the level of the walking/ working surface. Toe boards shall be securely fastened in place at the outermost edge of the platform and have not more than $\frac{1}{4}$ inch clearance above the walking/ working surface. Toe boards shall, also, be solid or with openings not over one inch in the greatest dimension.

WORKING DISTANCE

No gaps greater than 14 inches are permitted between the structure being worked on and the scaffold platform, except when lathing and plastering when the gap may be 18 inches wide.

OVERLAPS

Platforms must be cleated, nailed, or otherwise restrained at each end, or must overlap the centerline support at least 6 inches. Unless it is designed and installed to support employees and materials without tipping, or designed to block employee access, each end of a platform must not extend over its support more than 12-inches, for platforms 10 feet or shorter in length. Platforms 10 feet or longer must not extend over supports more than 18 inches.

On scaffolds where platforms are overlapped to create a long platform, the overlap may only occur over supports, and may not be less than 12 inches, unless the platforms are restrained (i.e., nailed together) to prevent movement.

On scaffolds where platforms are abutted to create a long platform, each abutted end must rest on a separate support surface, with the exception of the use of shared support members such as "T" sections, and hook-on platforms that rest on common supports, etc.

When platforms must overlap because of changes in direction, such as around a corner, platforms that rest on a bearer at an angle other than a right angle shall be laid first, and platforms that rest at right angles over the same bearer shall be laid second, on top of the first platform.

CAPACITY

Scaffolds or their components must not be loaded beyond their maximum capacity, which is their own weight and four times the maximum intended load.

Some common ways scaffolds are overloaded include:

- Too many people on the platform
- Too much material stored on the platform
- Point loading or concentrating too much of the load in one area

INSPECTIONS

Scaffolds and scaffold components shall be inspected for visible defects by a competent person prior to each work shift and after any event that could impact the scaffold's structural integrity. Scaffolds shall be erected, moved, dismantled, or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling, or operation.

E: ACCESSING SCAFFOLDS

The Occupational Safety and Health Administration (OSHA) states that employees must be able to safely access any level of a scaffold that is 2 feet above or below an access point. Direct access to or from another surface is permitted only when the scaffold is not more than 14 inches horizontally and not more than 2 feet vertically from the other surface. Since OSHA forbids the use of cross braces as a means of access, other provisions should be made. Portable, hook-on, and attachable ladders are often used to safely access scaffolds; however, they must be positioned so as not to tip the scaffold.

HOOK-ON LADDERS

Hook-on and attachable ladders must be especially designed for the specific type of scaffold being used.

Ladder rungs must be positioned so that their bottom rung is not more than 24 inches (2 feet) above the scaffold's supporting level and most incorporate the following:

- Uniform spacing between rungs with a maximum in-between distance of 16 $\frac{3}{4}$ inches
- Have minimum rung length of 11 $\frac{1}{2}$ inches
- Have rest platforms at a maximum of 35-foot vertical intervals

STAIRWAY LADDERS

Stairway ladders must have slip-resistant treads on all steps and landings.

Steps and rungs of ladders must line up vertically with each other between rest platforms. Additionally, they must:

- Be positioned so that their bottom step is not more than 2 feet above the scaffold supporting level
- Have rest platforms at a maximum 12-foot vertical interval
- Have a minimum step width of 16 inches, except for mobile scaffold stairway-type ladders, which must have a minimum step width of 11 $\frac{1}{2}$ inches

INTEGRAL LADDERS

Integral or built-in scaffold frames are often used as a means of access to scaffold units. On these occasions, frames must be specifically designed and constructed for use as a ladder rung. Rungs are not to be used as work platforms if they are less than 11 $\frac{1}{2}$ inches in length unless each affected employee uses fall protection. Rungs are required to be uniformly spaced and possess a length of at least 8 inches, with a maximum space between rungs of 16 $\frac{3}{4}$ inches. Additionally, there must be rest platforms provided at a maximum of 35-foot vertical intervals when applicable.

STAIR TOWERS

Requirements for the use of stair towers include:

- A stair rail consisting of a toprail and a midrail shall be provided on each side of the stairway

- The toprail of each stair rail system shall be capable of serving as a handrail unless a separate handrail is provided
- Sufficient space on handrails and toprails for employees to grasp them to avoid falling
- Stair rails and handrails surfaced to prevent snagging clothing, or puncturing/lacerating employees
- Ends of stair rails and handrails constructed so that they do not constitute a projection hazard
- A space of at least 3 inches between handrails or stair rails used as handrails, and other objects.
- A distance of no less than 28 inches and no more than 37 inches from the upper surface of the stair rail to the forward edge of the tread, in line with the face of the riser at the forward edge of the tread.
- A landing platform at least 18 inches wide by 18 inches long at each level
- A scaffold stairway width of at least 18 inches between stair rails
- Slip-resistant surfaces on treads and landings.
- Uniform tread depth that remains within ¼-inch for each flight of stairs.

RAMPS

Ramps and walkways 6 feet or more above lower levels must have guardrails. No ramp or walkway shall incline more than 1:3 (one vertical to three horizontal, or 20 degrees above the horizontal). If a ramp or walkway has a slope of more than 1:8, it must have cleats securely fastened to the planks not more than 14 inches apart, to provide footing.

F: FALL PROTECTION

The number one scaffold hazard is worker falls. Fall protection consists of either personal fall-arrest systems or guardrail systems and must be provided on any scaffold 10 feet or more above a lower level.

Employees performing overhand bricklaying operations from a supported scaffold must be protected from falling from all open sides and ends of the scaffold, except at the side next to the wall being laid.

FALL ARREST SYSTEMS

Personal fall-arrest systems used on scaffolds are to be attached by lanyard to a vertical lifeline, horizontal lifeline, or scaffold structural member. Remember that vertical lifelines may not be used on two-point adjustable suspension scaffolds that have overhead components such as overhead protection or additional platform levels.

When vertical lifelines are used, they must be fastened to a fixed safe point of anchorage, independent of the scaffold, and be protected from sharp edges and abrasion. Safe points of anchorage include structural members of buildings, but not standpipes, vents, electrical conduit, etc., or anything that may give way under the force of a fall. All anchor points must be approved by an engineer.

It is impermissible for two or more vertical lifelines to be attached to each other or to the same point of anchorage. When horizontal lifelines are used, they are to be secured to two or more structural members of the scaffold.

When lanyards are connected to horizontal lifelines or structural members, the scaffold must have additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in case one or both of the suspension ropes fail. These independent support lines must be equal in number and strength to the suspension ropes. On suspended scaffolds with horizontal lifelines that may become vertical lifelines, the devices used to connect to the horizontal lifeline must be capable of locking in both directions.

GUARDRAILS AND MIDRAILS

Guardrail systems must be installed along all open sides and ends of platforms and must be in place before the scaffold is released for use with the exception of erectors and dismantlers. Guardrails must be surfaced to prevent punctures or lacerations to employees, and to prevent snagging of clothing, which may cause employees to lose their balance. The ends of rails may not extend beyond their terminal posts unless they do not constitute a projection hazard to employees.

Each toprail or equivalent member of a guardrail system must be able to withstand a force of at least 200 pounds applied in any downward or horizontal direction at any point along its top edge. The top edge height of top rails on supported scaffolds must be between 38 and 45 inches. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria.

Midrails, screens, mesh, intermediate vertical members, solid panels, etc., must be able to withstand a force of at least 150 pounds applied in any downward or horizontal direction at any point along the midrail or other member. When midrails are used, they must be installed at a height approximately midway between the top edge of the guardrail system and the platform surface. Cross bracing is acceptable in place of a midrail when the crossing point of two braces is between 20 inches and 30 inches above the work platform or as a top rail when the crossing point of two braces is between 38 inches and 48 inches above the work platform.

When screens and mesh are used, they must extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.

ERECTORS AND DISMANTLERS

The competent person is responsible for determining the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Fall protection is required for scaffold erectors or dismantlers on supported scaffolds where feasible and where installation and use does not create a greater hazard. Additionally, fall protection is required for employees installing suspension scaffold.

G: SUPPORTING SCAFFOLDS

A supported scaffold is defined as a scaffold consisting of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

Employees are not permitted to work on or from a scaffold during storms or high wind, unless a competent person has determined that it is safe and that employees are protected by a personal fall arrest system or wind screens. When windscreens are used, the scaffold must be secured against the anticipated wind forces.

BASE SECTION

SUPPORT STRUCTURES

Scaffolds must be built on a level foundation. In order to assure stability, scaffolds must be built on base plates, mudsills, or a comparable adequate firm foundation. Footings must be capable of supporting the loaded scaffold without settling or displacement. Unstable objects may not be used to support scaffold or platform unit.

- **Bracing:** Frames and panels must be connected by cross, horizontal, or diagonal braces, alone or in combination, which secure vertical members together laterally. As frames are stacked, cross braces must be long enough to keep the scaffold level and square. All brace connections must be secured to prevent dislodging.

- **Pinning:** Frames and panels must be joined together vertically by coupling or stacking pins or a comparable equivalent means. They must be locked together to prevent separation of the panel from the frame below it.
- **Components:** Scaffold components may not be intermixed unless they fit together without force, and a competent person has determined the structure is still sound.
- **Stability:** When a scaffold reaches a height greater than four times its minimum base (4:1), it must be restrained from tipping by guy wires, ties, or braces. These must be installed at locations where horizontal scaffold components support both inner and outer legs. They shall be used to prevent the tipping of supported scaffolds bearing eccentric loads, such as cantilevered work platforms.
 - Guy wires, ties, and braces must be installed according to the manufacturer's recommendations or at the closest horizontal member and be repeated every 20 vertical feet for narrow scaffolds, 3 feet or less in width, and every 26 vertical feet for wider scaffolds, 3 feet or greater in width.
- **Inspection:** The competent person must inspect scaffolds for visible defects before each shift and after any occurrence that could affect a scaffold's structural integrity. Any part of a scaffold that is damaged or weakened to the point of no longer meeting OSHA's strength requirements must be repaired, replaced, braced, or removed from service.
- **Moving:** Scaffolds may not be moved while employees are on them unless they have been designed for that purpose by a registered professional engineer.
- **Fall Protection:** Each employee on a scaffold more than 10 feet above a lower level must be protected from falling. Fall protection consists of either personal fall arrest systems or guardrail systems.

H: CONTRACTORS

The procedures outlined in this program are not intended to represent or replace the Contractor's own programs for safety, nor does this program address and is not responsible for the Contractor's duty to its own employees. Although these procedures highlight some regulatory issues, it is not an exhaustive outline of all applicable laws and regulations for fall protection. The Contractor may not rely on this manual for guidance on legal requirements relating to safety for its employees.

Each contractor is responsible for fulfilling the requirements of the contract in a manner that protects the health and safety of the OSU community, including students, faculty, staff, contractors, and visitors. To this end, OSU expects that Contractors shall comply with the contents of this program and any project-specific guidelines developed by OSU. Compliance with such contents and guidelines are minimum standards, however, and shall not fully satisfy the contractor's responsibility to provide a safe environment and workplace. In the event that legal regulations, industry practices, the Contractor's practices, or project specific guidelines provided by OSU impose more stringent requirements than those established by this program, the Contractor must comply with the more stringent requirements.

Nothing contained herein shall relieve the Contractor from any liability or responsibility for failure to maintain a safe environment and workplace, nor transfer to OSU any obligation to supervise the Contractor's maintenance of appropriate safety standards.

REQUIREMENTS

- Scaffolding shall comply with 29 CFR 1926 Subpart L and manufacturer's instructions.
- University personnel who must access Contractor scaffolding for purposes of inspection or related work activities shall complete OSU EHS Scaffold safety training prior to access.
- Contractors shall make routine and periodic inspection data available to university personnel upon request.

I: TRAINING

EHS will provide training to all OSU employees so all personnel whose work involves scaffolding become proficient in the requirements of this program. All personnel must gain the understanding, knowledge, and skills necessary for the safe performance of their assigned duties. OSU Scaffolding training is required for all personnel prior to participating in the use of scaffolds. Training employees on scaffold use should only be conducted by someone who is familiar with the subject matter, can identify associated hazards and understands the procedures to control or minimize them.

Training should include the following topics as applicable:

- The nature of scaffold hazards including electrical hazards, fall hazards, and falling object hazards.
- The correct procedures for erecting, disassembling, moving, operating, repairing, and maintenance of scaffolds.
- The design criteria, maximum intended capacity, and the intended use of the scaffold.
- Any other pertinent requirements of OSHA 29 CFR 1926 Subpart L, and 29 CFR 1910.28.

RETRAINING REQUIREMENTS

Retraining of an employee is required under the following circumstances:

- The employee lacks the skills or understanding needed for safe erection, disassembly, and use of scaffolding.
- Worksite changes present a hazard about which the employee has not been trained.
- Changes in the equipment, conditions, or process present a hazard about which the employee has not been trained.
- Where inadequacies in an affected employee's work involving scaffolds indicate the employee has not retained the information.

P: DIRECTORY

Environmental Health and Safety

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Emergency - ambulance, fire, police / 911

APPENDIX A: DEFINITIONS

- **Access:** The point at which a person can get to and exit a scaffold.
- **Base Plates:** A component of a scaffold located on the foot of a pole or frame to assist in stabilizing the scaffold.
- **Braced:** A tie that holds one scaffold member in a fixed position with respect to another member. Brace also means a rigid type of connection holding a scaffold to a building or structure.
- **Competent Person:** one who through a combination of knowledge, experience and training can identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate those hazards.
- **Coupler:** A device for locking together the component tubes of a tube and coupler scaffold.
- **Guardrails:** A vertical barrier, consisting of top rails, midrails, and posts, erected to prevent employees from falling off of a scaffold platform or walkway to lower levels.
- **Harness:** A design of straps that are secured about the employee in a manner to distribute the arresting forces over at least the thighs, shoulders, and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration device.
- **Hoist:** A mechanical device to raise or lower a suspended scaffold. It can be mechanically powered or manually operated.
- **Maximum Intended Load:** The total load of all employees, equipment, tool, materials, transmitted, wind, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.
- **Mechanically Powered Hoist:** A hoist which is powered by other than human energy.
- **Outriggers:** The structural member of a supported scaffold used to increase the base width of a scaffold in order to provide greater stability for the scaffold.
- **Platform:** The horizontal working surface of a scaffold.
- **Professional Engineer:** A person who holds a degree from a university or a certification from an association as an engineer.
- **Qualified Person:** A person who by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.
- **Rated Load:** The manufacturer's specified maximum load to be lifted by a hoist or to be applied to a scaffold or scaffold component.
- **Safety Belt:** A strap with means for securing about the waist or body and for attaching to a lanyard, lifeline, or deceleration device.
- **Scaffold:** Any temporary elevated or suspended platform and its supporting structure used for supporting employees or materials or both, except this term does not include crane or derrick suspended personnel platforms.
- **Screw Jacks:** A component of the scaffold that is attached to the frame and the base plate and is used to assist in leveling the scaffold.
- **Sill:** A horizontal piece that forms the lowest member or one of the lowest members of a framework.