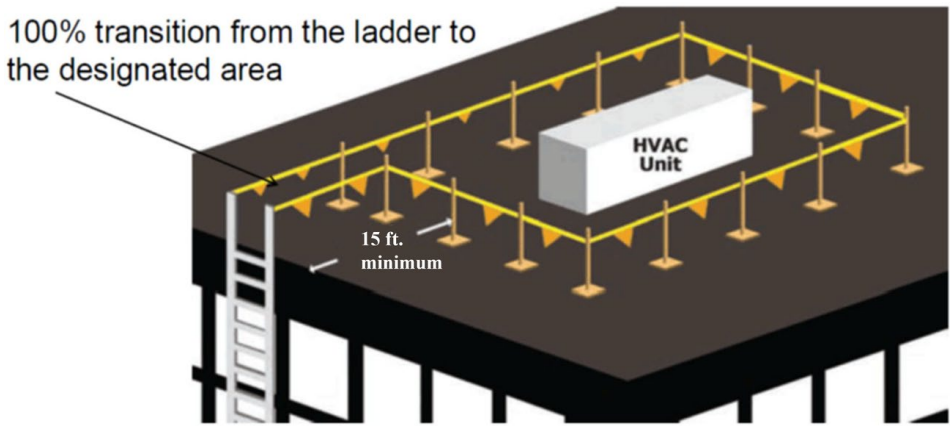


Note:
[1] Used on roofs during maintenance work, that is, inspecting or maintaining HVAC equipment (not roofing work).
[2] Similar to warning line system for construction.

Figure 21-2. Designated Area

21-10. Checklists and Forms.
Not Applicable.

Chapter 22
Work Platforms and Scaffolding

22-1. References.

a. ANSI/ASSP A10.8, Scaffolding Safety Requirements (https://www.assp.org) (22-1.a)

b. ANSI/American Ladder Institute (ALI) A14.2, Ladders - Portable Metal - Safety Requirements (https://webstore.ansi.org) (22-1.b)

c. ANSI/ALI A14.5, Ladders - Portable Reinforced Plastic - Safety Requirements (https://webstore.ansi.org) (22-1.c)

d. ANSI/SAIA A92.2, Vehicle-Mounted Elevating and Rotating Aerial Devices (https://shop.saiaonline.org) (22-1.d)

e. ANSI/SAIA A92.9, Mast-Climbing Work Platforms (https://shop.saiaonline.org) (22-1.e)

f. ANSI/SAIA A92.20, Design, Calculations, Safety Requirements and Test Methods for Mobile Elevating Work Platforms (https://shop.saiaonline.org) (22-1.f)

g. ANSI/SAIA A92.22, Safe Use of Mobile Elevating Work Platforms (https://shop.saiaonline.org) (22-1.g)

h. ANSI/SAIA A92.24, Training Requirements for the Use, Operation, Inspection, Testing, and Maintenance of Mobile Elevating Work Platforms (https://shop.saiaonline.org) (22-1.h)

i. ANSI/Industrial Truck Standards Development Foundation B56.6, Safety Standard for Rough Terrain Lift Trucks (https://webstore.ansi.org) (22-1.i)

j. IPAF/SAIA, Guidelines for the Safe Use of Mast Climbing Work Platforms (https://www.ipaf.org/en-us/resource-library/guidelines-safe-use-mast-climbing-work-platforms) (22-1.j)

k. SAIA/Scaffolding, Shoring & Forming Institute Publication SP201, Code of Safe Practices for Frame Scaffolds, System Scaffolds, Tube and Clamp Scaffolds & Rolling Scaffolds (https://www.saiaonline.org/scaffolding) (22-1.k)

l. Voluntary Product Standard PS 20-20, American Softwood Lumber Standard ((https://www.wbdg.org/ffc/nist/voluntary-product-standards/nist_ps20) (22-1.l)

m. 29 CFR 1926.451, General Requirements (https://www.govinfo.gov/content/pkg/CFR-2019-title29-vol8/pdf/CFR-2019-title29-vol8-sec1926-451.pdf) (22-1.m)

n. 29 CFR 1926.452, Additional Requirements Applicable to Specific Types of Scaffolds (https://www.govinfo.gov/content/pkg/CFR-2019-title29-vol8/pdf/CFR-2019-title29-vol8-sec1926-452.pdf) (22-1.n)

o. 29 CFR 1926 Subpart CC, Cranes and Derricks in Construction (https://www.govinfo.gov/content/pkg/CFR-2022-title29-vol8/pdf/CFR-2022-title29-vol8-part1926-subpartCC.pdf) (22-1.o)

p. 29 CFR 1926 Subpart L, Scaffolds (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol8/pdf/CFR-2020-title29-vol8-part1926-subpartL.pdf) (22-1.p)

q. 29 CFR 1926 Subpart X, Stairways and Ladders (https://www.govinfo.gov/content/pkg/CFR-2020-title29-vol8/pdf/CFR-2020-title29-vol8-part1926-subpartX.pdf) (22-1.q)

22-2. Definitions.

a. Competent Person (CP), Scaffolding. A person designated in writing by the employer to be responsible for immediate supervision, implementation, and monitoring of the Scaffold Work Plan. Must have training, knowledge, and experience in scaffolding to be capable of identifying, evaluating, and addressing existing and

potential hazards. This individual must have the authority to take prompt corrective measures with regard to such hazards. The term “Competent Person (CP),” as used in this chapter, refers to “Competent Person, Scaffolding.” (22-2.a)

b. Float/Ship Scaffold. A scaffold hung from overhead supports by means of ropes and consisting of a unit having diagonal bracing underneath. The scaffold rests upon and is securely fastened to two parallel planks bearers at right angles to the span. (22-2.b)

c. Ledger. A horizontal scaffold member upon which bearers rest; the longitudinal member that joins scaffold uprights, posts, poles, and similar members. (22-2.c)

d. Mast Climbing Work Platform (MCWP). A hoist having a working platform used for temporary purposes to raise personnel and materials to the working position by means of a drive system mounted on an extendable mast which may be tied to a building. (22-2.d)

e. Mobile Elevating Work Platforms (MEWP). Any vehicle mounted device, telescoping, or articulating, or both, which is used to position or elevate personnel to jobsites or activities above the ground. May be made of other material (metal, wood, fiberglass reinforced plastic or other); may be power or manually operated; includes: (22-2.e)

(1) Aerial Ladder. An aerial device consisting of a single- or multiple-section extendable ladder.

(2) Articulating Boom Platform. An aerial device with two or more hinged boom sections.

(3) Insulated Aerial Device. An aerial device designed for work on energized lines and apparatus.

f. Mudsill. A 2 inch x 10 inch x 8 inch (5.1 cm x 25.4 cm x 20.3 cm) (minimum) wood plate that is used to distribute the scaffolding load over a suitable ground area. (22-2.f)

g. Outrigger. Extendable or fixed structural members with one end attached to the base of a piece of equipment and the other end resting on floats on the ground used to distribute loads in supporting equipment. (22-2.g)

h. Platform. A work surface elevated above lower levels. Platforms can be constructed using individual wood planks, fabricated planks, fabricated decks, and fabricated platforms. (22-2.h)

i. Qualified Mast-Climbing Work Platform (MCWP) Operator. An employee designated in writing by the employer that has been trained by a CP for Scaffolding;

must be able to recognize hazards associated with mast-climbing scaffolds; have specific equipment familiarization prior to operation. (22-2.i)

j. Qualified Person (QP). See paragraphs 1-2 or 2-2, as applicable. (22-2.j)

k. Registered Professional Engineer (RPE). See paragraphs 1-2 or 2-2, as applicable. (22-2.k)

l. Runway. A personnel passageway elevated above the surrounding floor or ground level, such as a foot walk along shafting or a walkway between scaffolds. (22-2.l)

m. Scaffold. Temporary elevated platform (supported or suspended) and its supporting structure (including anchorage points), used for supporting employee(s), materials, or both. (22-2.m)

n. Scaffold, Hanging. A scaffold/work platform that is hung from a location (such as a lock gate) for work to be performed and that remains stationary until it is then repositioned with a crane/hoisting device. (22-2.n)

o. Scaffold, Load Ratings. Maximum loadings for the following categories: (22-2.o)

(1) Heavy Duty. A scaffold designed and constructed to carry a working load of 75 lbs/ft^2 (3.2 kg/m^2), that is intended for stone masonry work, with storage material on the platform.

(2) Medium Duty. A scaffold designed and constructed to carry a working load of 50 lbs/ft^2 (2.1 kg/m^2), that is intended for bricklayers or plasterers, with weight of material in addition to workers.

(3) Light Duty. A scaffold designed and constructed to carry specific working load of 25 lbs/ft^2 (1.1 kg/m^2), that is intended for workers only, with no material storage other than weight for tools.

(4) Special Duty. A scaffold designed and constructed to carry specific types of objects, such as palletized materials. The design of planks and other types of scaffold units, the scaffold, and accessories will be based on categories of load ratings.

p. Scaffold, Mason’s Multiple-Point Adjustable Suspension. A scaffold having a continuous platform supported by bearers suspended by wire rope hoists from overhead supports. (22-2.p)

q. Scaffold, Metal Frame. A scaffold consisting of a work platform supported by prefabricated metal frames. (22-2.q)

r. Scaffold, Needle-Beam. A platform resting on two bearers that is suspended by a line. (22-2.r)

s. Scaffold, Pump Jack. A scaffold consisting of a work platform supported by movable support brackets mounted on vertical poles. (22-2.s)

t. Scaffold, Trestle Ladder. A work platform supported by a trestle ladder. A trestle ladder is self-supporting portable ladder that can be adjustable in length, consisting of two sections, hinged at the top to form equal angles with the base. (22-2.t)

u. Scaffold, Tube and Coupler. A scaffold consisting of a work platform supported by individual pieces of tubing (uprights, bearers, runners, bracing) connected with couplers. (22-2.u)

v. Scaffold, Two-Point Suspension (swinging scaffold/swinging stage). A suspension scaffold consisting of a platform supported by hangers (stirrups) suspended by two ropes from overhead supports and equipped with means to raise and lower the platform. (22-2.v)

w. Scaffold, Window Jack. A supported scaffold consisting of a platform supported by a bracket or jack that projects through a window opening. (22-2.w)

x. Supported Scaffolds. One or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support such as frame scaffolds or fabricated frame, pole or wood pole, mobile scaffolds, mast climbing scaffolds. (22-2.x)

y. Turbine Maintenance Platforms (TMPs). A type of scaffold unique to hydropower operations and maintenance that incorporates aspects of both suspended scaffolds and hanging scaffolds. These TMPs are assembled in the draft tube below the turbine where they are physically attached to the structure. Some TMPs must be assembled below the turbine at the draft tube door level and raised into position and may also be required to be close to the turbine blades such that the TMP must wrap around the turbine hub. This applies to vertical access turbines where the TMP is assembled under the runner. (22-2.y)

z. Vehicle-Mounted Elevating and Rotating Work Platforms. An elevating and rotating work platform mounted on the chassis of a commercial vehicle. (22-2.z)

22-3. Personnel Required Qualification/Training.

a. Scaffold Users. (22-3.a)

(1) Personnel must be qualified and properly trained prior to utilizing work platforms and scaffolding or training others on the various systems.

(2) The employer must provide training to each employee who performs work while on a scaffold. Training must be conducted by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training must include the following areas, as applicable:

(a) The nature of any electrical hazards, fall hazards, and falling object hazards in the work area.

(b) The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used.

(c) The proper use of the scaffold, and the proper handling of materials on the scaffold.

(d) The maximum intended load and the load-carrying capacities of the scaffolds used.

(e) Reading and understanding the manufacturer's operating manual and any associated rules and instructions and understanding all decals and warnings.

(f) Any other pertinent requirements of OSHA, applicable ANSI standard, and the manufacturer’s instructions.

Note. All non-user trained personnel (for example, building inspectors, consultants) that may need to be on a scaffold must have as a minimum, safety/hazard awareness training, and be escorted by a trained user while on the scaffold.

b. Competent Person (CP), Scaffolding. CPs must meet the following training and qualification requirements: (22-3.b)

(1) Have a documented minimum of 8-hours of scaffold training, to include training on the specific type of scaffold being used (for example, mast climbing, adjustable, tubular frame).

(2) Be experienced on the specific scaffolding systems/types, assessment of the base material the scaffold will be erected upon, load calculations for materials and personnel, erection, and dismantling.

(3) Have training with special steps for installation.

(4) Knowledgeable in the drawing and how the scaffold/platform is installed and removed from the areas it is installed.

(5) CP training requirements are determined by the employer but must include:

(a) Assessment of the base material the scaffold will be erected upon.

(b) Load calculations for materials and personnel.

(c) Erection and dismantling.

(d) Meet the training requirements in the applicable ANSI standard.

c. Erectors and Dissembler Personnel. Anyone involved in erecting, disassembling, moving, operating, using, repairing, maintaining, or inspecting a scaffold must be trained by a CP to recognize any hazards associated with the work in question. Proof of training must be maintained onsite and made available to the USACE supervisor/KO or COR upon request. The training must include the following areas, as applicable: (22-3.c)

(1) Reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a QP on the contents on these documents.

(2) Reading and understanding all decals, warnings, and instructions on the device.

d. Mobile Elevating Work Platforms (MEWP) Operators. All MEWP operators must have training that includes both general as well as equipment- specific familiarization before being allowed to operate this equipment. Training records must be maintained for at least three years and maintained onsite. (22-3.d)

e. Mobile Elevating Work Platforms (MEWP) Occupants. Anyone occupying a MEWP must have instruction to operate an MEWP in the event of an emergency and the operator cannot perform this function. This instruction does not give the occupant authorization to operate the controls at any time except in an emergency. The instruction must give the occupant the ability to perform lowering procedures for the MEWP according to ANSI A92.24. (22-3.e)

22-4. Roles and Responsibilities.

a. Competent Person (CP), Scaffolding will: (22-4.a)

(1) Provide oversite of employees who erect, dismantle, move, or alter scaffolds, determine if it is safe for employees to work on or from a scaffold during storms or high winds, and to ensure that a personal fall arrest system or wind screens protect these employees.

(2) Provide training for employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting scaffolds to recognize associated work hazards.

(3) Inspect scaffolds and scaffold components for visible defects before each work shift and after any occurrence which could affect the structural integrity and to authorize prompt corrective actions (see para 22-5).

(4) Inspect ropes on suspended scaffolds prior to each work shift and after every occurrence which could affect the structural integrity and take prompt corrective actions.

(5) Determine the feasibility and safety of providing fall protection and access.

(6) Evaluate the space between a hanging scaffold platform deck ends and the face of the vertical structure prior to use on each jobsite to determine if the space constitutes a hazard.

b. Registered Professional Engineer (RPE). When an RPE is required by 29 CFR 1926 Subpart L they will: (22-4.b)

(1) Stamp all designs that are not “off-the-shelf” scaffolding components or connections commercially available and certified by the manufacturer for use on scaffolds.

(2) Design and detail scaffolds according to this manual and any standard referenced.

(3) Provide stamped calculations and drawings for designs.

(4) Design drawings and specifications for all frame scaffolds over 125 feet (38.1 m) in height above the base plates must be designed by an RPE.

(5) Design mason’s multiple adjustable suspension scaffold connections.

(6) Design hanging scaffolds (see para 22-8.g).

(7) Design and certify TMP (see para 22-8.r).

c. Mobile Elevating Work Platforms (MEWP) Operators. Before operating an MEWP, the operator will: (22-4.c)

(1) Survey the work area for loose or soft ground, ditches, drop-offs or holes, bumps and floor obstructions, debris, overhead obstructions, ground and elevated energy sources, and other possible hazards.

(2) Ensure the MEWP is on a firm, level surface.

(3) Ensure the MEWP is loaded according to the manufacturer's instructions.

(4) Ensure that outriggers and/or stabilizers are used if required by the manufacturer.

(5) Ensure that, if the vehicle is on wheels, the wheels are locked or chocked.

(6). Ensure that the appropriate fall protection system is connected.

22-5. Inspection Requirements.

a. A CP must inspect all scaffold and scaffold components (for example, guardrails, planking, rope, brakes, governors, connections) for visible defects before each work shift, and after any occurrence which could affect a scaffold's structural integrity. (22-5.a)

b. A CP must inspect scaffolding that has been hoisted after configuration or assembly before initial use and again after each hoisting. This inspection must be documented on the scaffold inspection tag. (22-5.b)

c. All scaffold inspections must be documented on a scaffold inspection tag and all scaffolds will be tagged by the CP prior to use. Tags must meet the following: (22-5.c)

(1) Include name and signature of the CP.

(2) Include dates of initial and all daily inspections.

(3) Be readily visible, legible, and made from materials that will withstand the elements.

(4) Include wording that states one of the following:

(a) Scaffold is complete and safe to use,

(b) Scaffold is incomplete, not ready for use and reasoning,

(c) Scaffold is incomplete and unsafe to use.

Note. Tags are not required for MEWP.

Note. Colored coded scaffold tags are recommended. Example, green indicated a scaffold is complete and safe for use, yellow indicates a scaffold is incomplete, and red indicates a scaffold is unsafe to use.

d. Mast Climbing Work Platform (MCWP). A CP must perform and document daily maintenance inspections according to this manual, OSHA, and the manufacturer's instructions. Maintain copies of the inspection on the jobsite. (22-5.d)

e. Turbine Maintenance Platforms (TMP). (22-5.e)

(1) A CP must perform visual inspections according to this manual, OSHA, and manufacturer's instructions.

(2) TMP Testing. Immediately after fabrication and after any modification of the structural members, proof test the platform to 100% of its rated capacity. The test may take place in the fabricator's shop or other location provided the supports and connections are also tested to 100%. The full rated load must be statically applied for a minimum of 15 minutes. Following the load test, the TMP must be inspected for plastic deformation, fracture, and 100% of welds must receive non-destructive inspection.

f. Suspended Scaffolds. (22-5.f)

(1) A CP must inspect ropes on suspended scaffolds prior to each work shift and after every occurrence which could affect the structural integrity and take prompt corrective actions.

(2) Before use, a CP must evaluate direct connections to affirm that the supporting surfaces are capable of supporting the loads to be imposed.

g. Hanging Scaffolds. (22-5.g)

(1) Prior to initial use and after any modification of the structural members or secure attachment points, proof test the platform to 125% of its rated capacity. The test must take place on a structure the scaffold was designed for or a test structure with similar support member characteristics.

(2) Prior to use on each jobsite or placement location, performance test hanging scaffolds to 100% of the maximum intended load for the expected work. This test must be performed with the scaffold attached to the structure in the work location.

h. Work Stands. Inspect work stands for visible defects on a daily basis. Maintain work stands so they remain free of structural damage. (22-5.h)

22-6. Activity Hazard Analysis (AHA) Requirements.
Develop AHAs according to paragraphs 1-6 or 2-6, as applicable. An AHA must be prepared by the workers performing the work. The AHA must address all of the following elements, if applicable. If not applicable, reasoning must be provided:

a. Site conditions (for example, ground conditions, overhead utilities). (22-6.a)

b. The specific type of scaffolding to be used. (22-6.b)

c. Scaffold dimensions, to include height, width, depth, and length. (22-6.c)

d. Calculations for the anticipated loads. (22-6.d)

e. The name of the CP for Scaffolding. (22-6.e)

f. The method of marking or barricading to be used. (22-6.f)

g. The installation and removal steps. (22-6.g)

h. Fall protection. (22-6.h)

i. Working over water. (22-6.i)

j. Fire protection. (22-6.j)

k. Any other hazards identified. (22-6.k)

Note. The CP must review the AHA with the entire crew immediately prior to the start of work.

22-7. Minimum Plan Requirements.

a. A Scaffold Work Plan is required for the following scaffold types: (22-7.a)

(1) Tube and coupler, regardless of size.

(2) Supported scaffolds with a height to base width ratio greater than four to one.

(3) Suspended scaffolds.

(4) Scaffolds requiring tenting due to weather conditions.

b. The plan must include the following: (22-7.b)

(1) Detailed description of task to include:

(a) Scaffold type. Include dimensions, height, width, depth, and length.

(b) Scaffold layout.

(c) Access and egress (to include emergency egress).

(d) The method of marking or barricading to be used.

(e) Site conditions (for example, ground conditions, overhead utilities).

(f) Bracing/tiebacks, if required.

(2) Describe anticipated hazards.

(3) If fall protection is required, include a Fall Protection and Prevention Plan according to paragraph 21-7. Address feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds.

(4) Personnel required training/qualification (see para 22-3).

(5) Personnel roles and responsibilities (see para 22-4).

(6) Inspection and oversight methods.

(7) If a scaffold requires an engineer design by 29 CFR 1926 Subpart L, provide the signed RPE design.

22-8. General Requirements.

a. General. This chapter establishes safety requirements for the construction, operation, maintenance, and use of work platforms and scaffolding used in construction, alteration, demolition, operations, and maintenance of buildings and other structures. It does not apply to permanently installed platforms. (22-8.a)

(1) Comply with the following hierarchy and prohibitions when selecting an appropriate work platform:

(a) Only perform work using scaffolds, platforms, or temporary floors unless if the work cannot be safely performed from the ground or similar footing.

(b) Ladders may be used as work platforms only when allowed by manufacturer.

(c) Do not use ladder jacks, lean-to, or prop-scaffolds.

(d) Do not use emergency descent devices as working platforms (see chapter 19).

(2) Do not erect or use work platforms or scaffolds in the immediate vicinity of power lines or electrical conductors until such are insulated, de-energized, or otherwise rendered safe from accidental contact (see chapter 11).

(3) Do not work on scaffolds during storms, high winds, or other adverse weather conditions.

b. Access and Fall Protection. (22-8.b)

(1) Standard railings and handrails for stairs must comply with the requirements of chapter 24.

(2) Standard guardrails must comply with chapter 21.

(3) Scaffold Cross Bracing.

(a) Cross bracing is acceptable in place of a midrail of a guardrail system when the crossing point of two braces is between 20 inches (0.5 m) and 30 inches (0.8 m) above the work platform.

(b) Cross bracing is acceptable as a toprail of a guardrail system when the crossing point of two braces is between 38 inches (96.5 cm) and 48 inches (121.9 cm) above the work platform.

(c) The end points at each upright must not be more than 48 inches (121.9 cm) apart.

(d) Cross bracing cannot be used for both a midrail and top rail.

c. Scaffolds (excludes MEWPs). General requirements for all scaffolds. (22-8.c)

(1) Erection, moving, dismantling, or altering of scaffolding must be under the supervision of a CP for Scaffolding.

(2) Perform inspections according to paragraph 22-5.

(3) Where persons are required to work or pass under a scaffold, provide a screen (consisting of No. 18 gauge US Standard wire one-half (½) inch (1.3 cm) mesh or the equivalent) between the toe-board and the guardrail and extend over the entire opening, or restrict access to the potential impact area below.

(4) Capacities.

(a) Scaffolds and their components must meet the requirements contained in ANSI A10.8 or other applicable ANSI standard and be capable of supporting without failure at least 4 times the maximum anticipated load.

(b) Direct connections to roofs and floors and counterweights used to balance adjustable suspension scaffolds must be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 times (minimum) the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

(5) Design.

(a) The dimensions of the members and materials used in the construction of various working platforms or scaffolds must conform to the sizes shown in the ANSI A10.8 tables.

(b) Factory-fabricated scaffolds and components must be designed and fabricated according to the applicable ANSI standard. When there is a conflict between the ANSI standard and this manual concerning the design or fabrication of factory-fabricated scaffolds, the ANSI standard will prevail.

(c) Load-carrying timber members must be a minimum of 1,500 lb-f/in2 (10,342 kPa) (stress grade) construction grade lumber.

(c-1) All dimensions are nominal sizes (except where rough sizes are noted) according to Voluntary Product Standard DOC PS20.

(c-2) Where rough sizes are noted, only rough or undressed lumber of the size specified will satisfy minimum requirements.

(c-3) Lumber must be reasonably straight-grained and free of shakes, checks, splits, cross grains, unsound knots or knots in groups, decay and growth characteristics, or any other condition that will decrease the strength of the material (see para 22-8.c).

(d) When scaffolds are wrapped with tarps, poly enclosures, or similar materials, wind calculations must be calculated by a QP to determine the strength and placement of the ties.

(6) Supporting members and foundations must be of sufficient size and strength to safely distribute loading.

(a) Place supporting members on a firm, smooth foundation that will prevent lateral displacement.

(b) Do not use unstable objects such as barrels, boxes, loose bricks, or concrete blocks as supports.

(c) Plumb and securely brace vertical members (that is, poles, legs, uprights) to prevent swaying or displacement.

(7) Design and construct or select solid wood planking and platform for means of access based upon either the number of persons for which they are rated or the uniform load distribution to which they will be subjected, whichever is the more restrictive.

(8) Scaffolds must be plumb and level unless engineered and designed to contour as the structure does.

(9) Scaffolds (other than suspended scaffolds) must bear on base plates upon mudsills or other adequate firm foundation.

(10) Working levels of work platforms must be fully planked or decked.

(11) Planking.

(a) All wood planking selected for scaffold plank use must be recognized by grading rules established by a recognized independent inspection agency for the species of wood used.

(b) Do not exceed spans of 8 feet (2.4 m) for 2 inches x 10 inches (5.1 cm x 25.4 cm) (nominal), or 10 feet (3 m) for 2 inches x 9 inches (5.1 cm x 22.9 cm) (rough) solid sawn wood planks.

(c) Fabricated planks and platforms may be used in lieu of solid sawn wood planks. Adhere to maximum spans according to the manufacturer's instructions.

(d) Secure planking to prevent loosening, tipping, or displacement, and support or brace to prevent excessive spring or deflection. Use intermediate beams to prevent dislodgement of planks due to deflection.

(e) Fully plank or deck each platform on all working levels of scaffolds between the front uprights and the guardrail supports as follows:

(e-1) Install each platform unit (for example, scaffold plank, fabricated plank, fabricated deck, or fabricated platform) so that the space between adjacent units and the space between the platform and the uprights is no more than 1 inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

(e-2) Where the employer makes the demonstration as described above, the platform must be planked or decked as fully as possible and the remaining open space between the platform and the uprights must not exceed 9.5 inches (24.1 cm).

(f) When planking is lapped in a long run, lap each plank at its supports at least 12 inches (30.5 cm). Extend scaffold planks over the end supports at least 6 inches (15.2 cm) (unless the planking is manufactured with restraining hooks or equivalent means of preventing movement), but not more than 12 inches (30.5 cm). Lap or securely fasten work surfaces to the scaffold.

(g) Where the ends of planks abut each other to form a flush floor, position the butt joint at the centerline of a pole so that abutted ends rest on separate bearers.

(h) Position the front edge of all platforms not more than 14 inches (36 cm) from the face of the work unless guardrail systems are erected along the front edge and/or PFAS are used; the maximum distance from the face for plastering and lathing operations is 18 inches (46 cm).

(i) Support or brace planking to prevent excessive spring or deflection and secure and support to prevent loosening, tipping, or displacement.

(j) When a scaffold materially changes its direction, lay the platform planks to prevent tipping according to the following:

(j-1) Lay the planks that meet the corner bearer at an angle first (unless hook-on fabricated planks are used) and extend over the diagonally placed bearer far enough to have a good safe bearing, but not far enough to involve any danger from tipping.

(j-2) Lay the planking running in the opposite direction at an angle so as to extend over and rest on the first layer of planking.

(k) Maintain planks in good condition. Do not use planks when cracks exceed 1.5 times the width of the board, when notches are deeper than 1/3 the width of the plank, or with saw kerfs marks.

(l) When moving platforms to the next level, leave the existing platform undisturbed until the new bearers have been set to receive the platform planks.

(m) Do not store materials on scaffolds or runways in excess of supplies needed for that shift.

(12) Access.

(a) Provide an access ladder or equivalent safe access.

(b) Where a built-in ladder is part of a scaffold system, it must the requirements for ladders according to chapter 24.

(c) Climbing of braces is prohibited.

(d) Install an adequate gate (that is, inward swinging or chain guard) at ladder access points.

Note. For mast climbing scaffolding, swing scaffold, or other adjustable platform scaffolding systems, follow the fall protection requirements in chapter 21 or the manufacturer's instructions, whichever is more stringent.

(e) Hook-on or attachable ladders must be specifically designed for use with the type of scaffold. Position them so as not to tip the scaffold.

(f) When erecting or dismantling welded frame scaffolds, the end frames may be used as access provided the horizontal members are not more than 22 inches (55.9 cm) apart.

(g) The minimum clear length of the rungs must be at least 16 inches (40.6 cm).

(h) The distance from the supporting surface to the first step of a ladder, stair, or frame designed to be climbed must not exceed 2 feet (0.6 m).

(13) Where the scaffold height exceeds four times the minimum scaffold base dimension (and including the width added by outriggers, if used), the scaffold must be secured to the wall or structure.

(a) Place the first vertical and horizontal tie at this point.

(b) Repeat vertical ties at intervals not greater than 26 feet (7.9 m) with the top tie placed no lower than four times the base dimension from the top of the scaffold.

(c) Place horizontal ties at each end and at intervals not greater than 30 feet (9.1 m).

(d) When more stringent means of securing the scaffold are recommended by the manufacturer or an RPE, follow the more stringent requirements.

(14) When scaffolds are to be partially or fully enclosed, a QP must verify the adequacy of the number, placement, and strength of ties attaching the scaffold to the structure, taking into consideration wind loads and weather.

(15) When vehicles or mobile equipment are used or allowed adjacent to scaffolding, install substantial stop logs or barricades.

(a) The use of a ground guide is recommended, however, in such cases where it is determined that barricades are not feasible or they are not required based on distance, a ground guide will be used.

(b) Do not expose ground guides to potential falling objects from the scaffold or the equipment.

(c) Hanging scaffolds are exempt from this requirement unless the CP determines that vehicles or mobile equipment could pose a hazard to safe operation.

(16) Do not use brackets on scaffolds unless the tipping effect is controlled.

(17) The following types of scaffolds must be designed and constructed according to ANSI A10.8:

(a) Outrigger scaffolds.

(b) Needle-beam scaffolds.

(c) Interior hung scaffolds.

(d) Bricklayer's square scaffolds.

(e) Float/ship scaffolds.

(f) Boatswain's scaffolds.

(g) Window jack scaffolds.

(h) Carpenter's bracket scaffolds.

(i) Form scaffolds.

(18) Submit other types of scaffolding not included in ANSI A10.8 for review and approval by the USACE supervisor or acceptance by the KO or COR. The design must be approved by an RPE, or the system must meet a nationally recognized design standard.

d. Metal Scaffolds and Towers. (22-8.d)

(1) General Requirements:

(a) Do not use scaffold components made of dissimilar metals together unless a CP has determined that galvanic action will not reduce the strength of any component to a level below that required by paragraph 22-8.c.

(b) Securely connect the sections of metal scaffolds and securely fasten all braces.

(c) Provide a ladder or stairway for access that is affixed or built into the metal scaffolds. Position the ladder or stairway so that when in use it will not have a tendency to tip the scaffold.

(2) Tube and Coupler Scaffolds (see 29 CFR 1926.452).

(a) Tube and coupler scaffolds must have posts, runners, and bracing of nominal 2 inches (5.1 cm) (outside diameter) steel tubing or pipe, or if other structural metals are

used, they must be designed to carry an equivalent load. The size of bearers (outside diameter) and the spacing of posts must meet the requirements contained in ANSI A10.8.

(b) Limit tube and coupler scaffolds to heights and working levels according to ANSI A10.8. Drawings and specifications for tube and coupler scaffolds that exceed the limitations in ANSI A10.8 must be designed by an RPE.

(c) Construct all tube and coupler scaffolds to support four times the maximum intended loads according to ANSI A10.8 or as specified by an RPE (with knowledge in structural design).

(d) Erect runners along the length of the scaffold so they are located on both the inside and the outside posts at even heights.

(d-1) When tube and coupler guardrails and midrails are used on outside posts, they may be used in lieu of outside runners. If guardrail systems are removed to other levels, install extra runners to compensate.

(d-2) Interlock runners to form continuous lengths and couple them to each post.

(d-3) Install the bottom runners as close to the base as possible.

(d-4) Place runners not more than 6 feet - 6 inches (2 m) on center.

(e) Bearers.

(e-1) Install bearers transversely between posts.

(e-2) When coupled to the post, bear the inboard coupler directly on the runner coupler. When coupled to the runners, keep the couplers as close to the post as possible.

(e-3) Extend bearers beyond the posts and runners and to provide full contact with the coupler.

(f) Install bracing across the width of the scaffold at the ends of the scaffold at least every fourth level vertically and repeated every third set of posts horizontally.

(f-1) Extend such bracing diagonally from the outer post or runner at this level upward to the inner post or runner at the next level.

(f-2) Install building ties adjacent to bracing.

(g) Install longitudinal diagonal bracing across the inner and outer rows of poles at approximately a 45-degree angle in both directions from the base of the end post upward to the extreme top of the scaffold.

(g-1) Where the longitudinal length of the scaffold permits, repeat such bracing beginning at every fifth post.

(g-2) On scaffolds where the length is shorter than the height, extend the longitudinal bracing diagonally from the base of the end posts upward to the opposite end posts and then in alternating directions until reaching the top of the scaffold.

(g-3) Where conditions preclude the attachment of bracing to the posts, it may be attached to the runners.

(3) Fabricated Frame Scaffolds (Tubular Welded Frame Scaffolds) (see 29 CFR 1926.452).

(a) Space tubular welded panels or frames consistent with the loads imposed.

(b) Properly brace scaffolds by cross, horizontal, or diagonal braces (or combination of these) to secure vertical members together laterally. The cross braces must be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. Secure all brace connections.

(c) Set scaffold legs on adjustable bases or plain bases placed on mudsills or other foundations adequate to support the maximum rated loads.

(d) Place frames one on top the other with coupling or stacking pins to provide vertical alignment of the legs.

(e) Where uplift may occur, lock panels together vertically by pins or other equivalent suitable means.

(f) Drawings and specifications for all frame scaffolds over 125 feet (38.1 m) in height above the base plates must be designed by an RPE.

(4) Manually Propelled Mobile Scaffolds, including mobile work stands, such as “baker scaffolds.”

(a) All wheels and casters on rolling scaffolds must have a positive locking device, securely fastened to the scaffold, to prevent accidental movement.

(b) Lock all casters or wheels when a scaffold is occupied.

(c) Apply the force necessary to move the mobile scaffold as close to the base as practical and make provision to stabilize the tower during movement from one location to another.

(d) Use rolling scaffolds only on firm, level, and clean surfaces.

(e) Free-standing mobile scaffold working platform heights must not exceed three times the smallest base dimension.

(f) Do not permit persons to ride on manually propelled scaffolds unless all of the following conditions exist:

(f-1) The ground surface is within 3 degrees of level and free from pits, holes, or obstructions.

(f-2) The minimum dimension of the scaffold base (when ready for rolling) is at least one-half of the height and outriggers, if used, are installed on both sides of staging.

(f-3) The wheels are equipped with rubber or similar resilient tires.

(f-4) All tools and materials are secured or removed from the platform before the scaffold is moved.

Note. Follow all manufacturer's recommendations for use of outriggers.

e. Wood Pole Scaffolds (see 29 CFR 1926.452). (22-8.e)

f. Suspended Scaffolds. See 29 CFR 1926.452 for single-point adjustable suspension scaffolds and for two-point adjustable suspension scaffolds. (22-8.f)

(1) Suspended scaffolds must be designed, constructed, operated, inspected, tested, and maintained according to the operating manual for the device.

(2) All parts of all suspended scaffolds must have a minimum safety factor of four. A minimum safety factor of six is required for support ropes.

(3) Support Ropes.

(a) Attach support ropes at the vertical centerline of the outrigger so that the attachment will be directly over the hoist machine.

(b) Support ropes must be vertical for their entire length. Do not sway the scaffold nor fix the support ropes to any intermediate points to change the original path of travel.

(c) Equip the fixed end of the support rope with a proper size thimble and secure it by eye splicing or equivalent means. Braze or secure free ends to prevent fraying.

(d) For traction hoists, the support rope must be of such length that the operator can descend to the lowest point of travel without the end of the wire rope entering the hoist. Where the wire rope is inadequate for the lowest descent, make provision to prevent the hoist from running off the wire rope.

(e) For winding drum type hoists, running ends of suspension ropes must be attached by positive means to the hoisting drum so that at least four wraps of the rope will remain on the drum at all times.

(f) Support ropes must be capable of resisting chemicals or conditions to which they are exposed.

(g) Do not weld, burn, rivet, or perform open flame work on any platform suspended by fiber or synthetic rope.

(h) Do not use defective or damaged rope as lifelines or suspension lines. The repairing of wire rope is prohibited.

(4) All suspension scaffold support devices such as outrigger beams, cornice hooks, parapet clamps, or similar devices must meet the following:

(a) Be made of mild steel, wrought iron, or materials of equivalent strength.

(b) Be supported by bearing blocks.

(c) Rest on surfaces capable of supporting the reaction forces imposed by the scaffold hoist operating at its maximum rated load.

(d) Be secured against movement by tiebacks installed at right angles to the face of the building whenever possible and secured to a structurally sound portion of the building. Tiebacks must be equivalent in strength to the hoisting rope.

(5) Outrigger Beams.

(a) Outrigger beams must be made of structural metal and be restrained to prevent movement.

(b) Stabilize the inboard ends of outrigger beams by bolts or other direct connections to the floor or roof deck, or by counterweights. Do not use counterweights to stabilize mason's multiple point adjustable suspension scaffold outrigger beams.

(c) Mason's multiple point adjustable suspension scaffold connections must be designed by an RPE experienced in scaffold design.

(d) Counterweights must be made of non-flowable solid material secured to the outrigger beams by mechanical means. Do not remove until the scaffold is disassembled.

(e) Secure outrigger beams by tiebacks equivalent in strength to the suspension ropes. Secure the tiebacks to a structurally sound portion of the building or structure so that they are installed parallel to the centerline of the beam.

(f) Outrigger beams must be provided with stop bolts or shackles at both ends.

(g) When channel iron beams are used in place of I-beams, securely fasten the channels together with the flanges turned outward.

(h) Install outrigger beams so that all bearing supports are perpendicular to the beam centerline.

(i) Set and maintain outrigger beams with the web in a vertical position.

(j) Where a single outrigger beam is used, place the steel shackle or clevises with which the wire ropes are attached to the beam directly over the hoisting machines.

(6) Hoisting Machines.

(a) Hoisting machines must be of a type tested and listed by a NRTL.

(b) Each hoist must contain a name plate(s) containing the following:

(b-1) Manufacturer's name.

(b-2) Maximum load rating.

(b-3) Identification number.

(b-4) Wire rope specifications.

(c) Powered hoists must be electric-, air-, hydraulic-, or propane-powered. Gasoline-powered hoists are prohibited.

(d) All powered hoists must be equipped with speed reducers and a primary brake and a secondary brake.

(d-1) The primary brake must automatically engage whenever power is interrupted or whenever the operator ceases to apply effort.

(d-2) The secondary brake must stop and hold the hoist under over speed or abnormal conditions. All secondary brakes must be periodically tested under simulated conditions according to the manufacturer's instructions.

(e) Each powered hoist must have its own separate control.

(e-1) If the control is of the push-button type, it must be constant pressure.

(e-2) If the control is of the fixed-position type, it must have provision for automatic locking when in the off position or be guarded against accidental actuation.

(e-3) If the control is of the lever type, it may be of the constant pressure type or of the fixed-position type.

(f) Manual operation of powered hoists may be provided if the hoist is designed so that not more than one person per hoist is required to perform this operation.

(f-1) During manual operation, a means must be provided to make the prime mover inoperative.

(f-2) Provide instruction advising personnel to disconnect the power source before using a manual crank.

(g) Manually Operated Hoists.

(g-1) Provide a means to prevent rapid handle movement or fast un-spooling during manual operation. Do not place mechanisms used to allow fast un-spooling during the erection process on the scaffold.

(g-2) In the event a controlled descent device is used, it must not bypass the secondary brake.

(g-3) All winding drum hoists must be provided with a driving pawl and a locking pawl that automatically engages when the driving pawl is released.

(g-4) Gripping-type hoists must be designed so that the hoist is engaged on the suspension rope at all times, including all travel actuations of the operating lever.

(g-5) Each winding drum hoist must be provided with a positive means of attachment of the suspension hoist. The drum attachment must develop a minimum of four times the rated capacity of the hoist.

(g-6) Each hoist must require a positive crank force to descend.

(7) Working Surfaces on Suspended Scaffolds.

(a) Light metal platforms, when used, must be of a type tested and listed by an NRTL.

(b) Ladder-type platforms are prohibited.

(c) Planking.

(c-1) Planking must be composed of not less than nominal 2 inches x 10 inches (5.1 cm x 25.4 cm) unspliced planks, cleated together on the underside, starting 6 inches (15.2 cm) from each end at intervals not to exceed 4 feet (1.2 m).

(c-2) Do not extend the planking beyond the hangers more than 12 inches (30.5 cm). Securely fasten a bar or other effective means to the platform at each end to prevent its slipping off the hanger.

(c-3) The span between hangers for planked platforms must not exceed 8 feet (2.4 m).

(d) Beam platforms are prohibited.

(8) Guy, brace, guide, or equip suspended scaffolds with a tag line to prevent swaying.

(9) Two-Point Suspension Scaffolds.

(a) Two-point suspension scaffold platforms must not be less than 20 inches (50.8 cm) or more than 36 inches (91.4 cm) wide. Securely fasten the platform to the hangers by U-bolts or by other equivalent means.

(b) The hangers of two-point suspension scaffolds must be made of mild steel, or equivalent materials, having a cross sectional area capable of sustaining four times the maximum rated load and must be designed with a support for a standard railing.

(c) Securely lash two-point suspension scaffolds to the structure. Do not use window cleaner's anchors.

(d) The platform on every two-point suspension scaffold must be of the light metal or planking.

(e) Do not joint two-point suspension scaffolds by bridging.

(f) Two-point suspension scaffold platforms, when in use, must be level within 1 inch (2.5 cm) for every 1 foot (0.3 m) of platform length.

(10) Mason's Multiple-Point Adjustable Suspension Scaffolds.

(a) When employees on the scaffold are exposed to overhead hazards, provide overhead protection equivalent in strength to 2 inches (5.1 cm) planking on the scaffold not more than 9 feet (2.7 m) above the platform. The overhead protection must be laid tight and extend the entire width of the scaffold.

(b) The scaffold must be capable of sustaining a load of 50 lb/ft^2 (1.1 kg/m^2). Do not overload.

(c) Suspend the platform by wire ropes from overhead outrigger beams.

(11) Stonesetters' multiple-point adjustable suspension scaffolds must be designed and used according to ANSI A10.8.

(12) Working Capacities.

(a) On suspension scaffolds designed for a working load of 500 lb. (226.8 kg), do not permit more than two people to work at one time.

(b) On suspension scaffolds with a working load of 750 lb. (340.2 kg), do not permit more than three people to work at one time.

g. Hanging Scaffolds. (22-8.g)

(1) Hanging scaffolds must be designed by an RPE competent in structural design.

(2) Hanging scaffold performance and components must meet or exceed those for general scaffolds and platforms according to ANSI A10.8.

(3) Hanging scaffolds must meet the following requirements:

(a) Securely fasten the scaffold to a vertical structure (for example, wall, lock gate) by hooks over a secured structural supporting member, bolt-on brackets, or other secure attachment. Attachments must be made at least every 8 feet (2.4 m). The maximum span between secure attachments is 8 feet (2.4 m). Use fasteners of adequate size to achieve design strength of scaffold.

(b) Secure the scaffold to prevent an uplift force equal to two times the weight of the scaffold and its rated load by means of hooks, brackets, or other secure attachments designed and placed to counteract uplift.

(c) The scaffold must have a secondary attachment method to secure it against falling if the primary attachment fails. This should be a flexible attachment, such as wire rope or chain, designed to withstand a minimum of five times the weight of the scaffold

and its rated load. Connect the secondary attachment to an anchor point of the same load rating or greater.

(d) The scaffold must have only one working level. Working platform decks must be slip resistant and securely attached to the scaffold frame. The maximum width, front to back, of decks is 42 inches (106.7 cm). Grating used for deck surfaces must have a maximum width opening between bars small enough to prevent the rigging components used (for example, slings, chains) from entering.

(e) Install standard guardrails systems according to chapter 21 on all open sides and ends of the platform.

(f) The scaffold must be conspicuously posted with a plate or other permanent marking that indicates the following:

(f-1) Weight of the scaffold.

(f-2) Number of personnel it was designed to support.

(f-3) Rated weight capacity.

(f-4) Specific structure(s) it was designed to be attached to – this may be a code or other form of identification when designed for a number of different structures with similar structural attachment points.

(f-5) Name of the RPE who designed the scaffold.

(f-6) Date of manufacture.

(g) Hanging scaffolds designed to also function as crane- or other LHE-supported personnel work platforms must meet the requirements of chapter 16. This includes scaffolds that require a person to stand/ride on the platform while the initial attachment to the structure is made.

(h) Position the scaffold so that the space between the platform deck edge and the face of the vertical structure is not more than 14 inches (35.6 cm). Prior to use on each jobsite application, the CP must determine if this space constitutes a hazard by being large enough to allow tools or objects to fall on workers below or, if LHE rigging may enter and entangle in the space. In these situations, close or block the space to remove the hazard.

(4) Testing according to paragraph 22-5.g.

(5) Operations.

(a) Workers must use properly selected and anchored personal fall protection when accessing and working on hanging scaffolds. Personal fall protection system components must meet the requirements of chapter 21. Do not use any part of a hanging scaffold as an anchor point for personal fall protection.

(b) Do not exceed the number of workers on the platform listed on the scaffold.

(c) Ladder must not be used on hanging scaffolds, except as a means of access from above the deck. Ladders used for access must meet the requirements of chapter 24.

(d) Hanging scaffolds must be coated or painted to minimize corrosion of the components.

(e) Store the scaffold between uses to minimize damage to the scaffold.

h. Form and Carpenter's Bracket Scaffolding. (22-8.h)

(1) Scaffolds must be constructed of wood, steel, or aluminum members with known strength characteristics and be designed to support a minimum load of 25 lbs./ft^2 (1.1 kg/m^2).

(2) Do not permit more than two persons to occupy any given 8 feet (2.4 m) span of a bracket scaffold at any one time. Tools and materials must not exceed 75 lbs. (34 kg) in addition to person(s) occupying the area.

(3) Install a guardrail at all open sides or use another form of fall protection when a fall of 6 feet (1.8 m) or greater exists or, when other hazards exist below the platform (see chapter 21).

(4) Construct figure-four scaffolds as follows:

(a) Construct the scaffold from sound lumber. Do not exceed spacing of more than 8 feet (2.4 m) on center.

(b) Install a bracket ledger consisting of two pieces of 1 inch x 6 inches (2.5 cm x 15.2 cm) or heavier material nailed on opposite sides of the vertical form support. Install the ledgers so that they do not project more than 3.5 feet (1.1 m) from the outside of the form support. Securely brace and attach the ledger to prevent tipping or turning.

(c) Intersect the knee or angle brace and the ledger at least 3 feet (0.9 m) from the form at an angle of approximately 45 degrees. Nail the lower end to a vertical support.

(d) Construct the platform with two or more scaffold planks that extend at least 6 inches (15.2 cm) beyond the ledgers at each end unless secured to the ledgers. When planks are secured to the ledgers (nailed or bolted), use a wood filler strip between the ledgers. Limit unsupported projecting ends of planks to an overhang of not more than 12 inches (30.5 cm).

(e) Do not exceed the maximum permissible spans of planking according to ANSI A10.8. Span lengths must be consistent with allowable bearer loads.

(5) Metal brackets or scaffold jacks that are an integral part of the form must be securely bolted or welded to the form. Folding-type brackets must be either bolted or secured with a locking-type pin when extended for use.

(6) Clip-on or hook-over brackets may be used on form work provided the form walers are bolted to the form or secured by snap ties or tie-bolts extending through the form and securely anchored. In addition, carpenter bracket scaffolds may be attached by any of the following:

(a) A bolt extending through to the opposite side of the structural wall.

(b) A metal stud attachment device.

(c) Welding.

(d) Hooking over a secured structural supporting member.

(7) Metal brackets must not be spaced more than 8 feet (2.4 m) on centers.

(8) Either bolt scaffold planks to the metal brackets or install of such length that they overlap the brackets at each end by at least 6 inches (15.2 cm). Limit unsupported projecting ends of scaffold planks to a maximum overhang of 12 inches (30.5 cm).

(9) Limit the maximum permissible spans for planking consistent with allowable bearer loads.

(10) Bolt or secure folding-type metal brackets, when extended for use, with a locking-type pin.

(11) Design wooden bracket form scaffolds according to tables 22-1 and 22-2 so that they are an integral part of the form panel.

(12) Brackets must consist of a triangular shaped frame made of wood with a cross-section not less than 2 inches x 3 inches (5.1 cm x 7.6 cm) or of 1¼ inches x 1¼ inches x ⅛ inch (3.2 cm x 3.2 cm x 0.3 cm) structural angle iron.

(13) Design wooden scaffolds criteria according to tables 22-1 and 22-2

(14) Either nail or bolt scaffold planks to the runners or install so that they overlap the ledgers at each end by at least 6 inches (15.2 cm). Limit unsupported projecting ends of scaffold planks to a maximum overhang of 12 inches (30.5 cm).

(15) Limit the maximum permissible spans for planking consistent with allowable bearer loads.

i. Horse Scaffolds. (22-8.i)

(1) Do not construct or arrange horses more than two tiers or 10 feet (3 m) in height. Scaffolds must be 5 feet (1.5 m) or less in height and 5 feet (1.5 m) or more in width. When tiered heights exceed 6 feet (1.8 m), fall protection must be used. (See chapter 21)

(2) Construct horse scaffolds according to table 22-3, at minimum.

(3) Do not space the horse scaffolds more than 5 feet (1.5 m) for medium duty and not more than 8 feet (2.4 m) for light duty.

(4) When arranged in tiers, place each horse scaffold directly over the horse scaffold in the tier below. Nail or otherwise secure the legs to the planks to prevent displacement or thrust and cross brace each tier.

(5) Do not use weakened or defective components.

j. Pump Jack Scaffolds. (22-8.j)

(1) Pump jack scaffolds must be designed for a minimum working load of 500 lbs. (226.8 kg). Do not permit more than two persons on the scaffold at one time.

(2) Pump jack brackets, braces, and accessories must be fabricated from metal plates and angles and installed according to the manufacturer's instructions. Installation and operational manuals must be maintained onsite and made available upon request of the local SOHO/USACE supervisor/KO or COR.

(3) Fully deck and secure the planking on the standing platform. Do not overlap platforms thicker than 2 inches (5.1 cm).

(4) Construct the standing platform to be at least 18 inches (45.7 cm) wide and the work bench at least 12 inches (30.5 cm) wide.

(5) Secure all materials on the work bench from falling.

(6) Install a guardrail system on pump jack scaffolds according to the manufacturer's instructions. PFAS may be used in lieu of guardrails. See chapter 21 for personal fall arrest system requirements.

(7) When a workbench is used at an approximate height of 42 inches (106.7 cm), the toprail of the guardrail system may be eliminated if the workbench is fully decked, secured, and is capable of withstanding 200 lbs. (90.7 kg) force in any direction.

(8) Do not use workbenches as a standing platform.

(9) Provide a ladder for access to the platform.

(10) Support all poles by sills or other foundations adequate to support the load.

(11) Poles.

(a) Pole lumber must be 2 inches x 4 inches (5.1 cm x 10.2 cm) stock of Douglas fir, or equivalent, straight-grained, clear, free of cross-grain, shakes, large loose or dead knots, and other defects that might impair strength.

(b) Wood poles must not exceed 30 feet (9.1 m) in height.

(c) Wood pole spacing must not exceed 7 feet (2.1 m).

(d) Metal poles must not exceed 50 feet (15.2 m) in height unless the design is approved by an RPE.

(e) The spacing of metal poles must not exceed 7 feet (2.1 m) unless determined acceptable by an RPE.

(f) When poles are constructed of two continuous lengths, they must be of 2 inches x 4 inches (5.1 cm x 10.2 cm) (kiln dried straight grain fir) or equivalent, spiked together with the seam parallel to the pump jack, and with 10d common nails, 12 inches (30.5 cm) center-to-center, staggered uniformly from opposite outside edges.

(g) Do not splice 4 inches x 4 inches (10.2 cm by 10.2 cm) wood poles to increase the length of any individual member.

(h) Secure poles to the wall by triangular bracing, or equivalent, at the bottom, top, and other points to provide a maximum vertical spacing of not more than 10 feet (3 m) between braces. Each brace must be capable of supporting a minimum of 225 lbs. (102.1 kg) tension or compression.

(i) When wood scaffold planks are used as platforms, do not space the poles used for pump jacks more than 10 feet (3 m) on center. When fabricated platforms are used that comply with all other provisions of paragraph 22-8.j pole spacing may exceed 10 feet (3 m) on center if permitted by the manufacturer.

(j) Do not place poles within 10 feet (3 m) of power lines or electrical conductors until such are insulated, de-energized, or otherwise rendered safe against contact (see chapter 11).

(12) Brackets.

(a) Each pump jack bracket must have two positive gripping mechanisms to prevent any failure or slippage.

(b) For the pump jack bracket to pass bracing already installed, use an extra brace approximately 4 feet (1.2 m) above the one to be passed until the original brace is reinstalled.

k. Adjustable Scaffolds. (22-8.k)

(1) Design and construct adjustable scaffolds according to ANSI A10.8.

(2) Maintain a copy of the user's manual onsite at all times.

(3) Secure adjustable scaffolds to the structure according to the manufacturer's user manual.

(4) Safe Access.

(a) If portable ladders are used, they must be removed every time the platform is raised, lowered, or repositioned to ensure that the 4:1 ratio is maintained. Secure the ladder to prevent movement. (See chapter 24)

(b) When stair towers are used for access to adjustable scaffolds, the difference between the two elevations must be 2 feet (0.6 m) or less.

(c) An SRL, if allowed by the manufacturer, can be used to provide fall protection when climbing the tower (see chapter 21).

(d) On towers over 20 feet (6.1 m), provide rest platforms at least every 20 feet (6.1 m).

(5) Level the adjustable scaffold by using leveling jacks.

(6) When bridges are used on a single tower, do so only in strict compliance with the manufacturer’s instructions.

(7) Ratchet driven winding drum hoist must be equipped with a driving pawl and a locking pawl. The locking pawl must automatically engage when the driving pawl is released.

(8) All crank-driven winding drum hoists must employ a positively actuated locking pawl that engages the drive train of the hoist and is actuated by reverse descending movement of the crank handle. This mechanism must not be rendered inoperative by outside contamination.

(9) Every winding drum must contain at least three wraps of the suspension wire rope at the lowest point of hoist travel.

(10) Each hoist must be provided with positive wire rope attachments. Wire rope attachments must develop a minimum of 80% of the wire rope breaking strength.

(11) Terminate wire rope according to the manufacturer's instructions. Do not use U-type wire rope clips as a wire rope termination method.

(12) The wire rope must be capable of supporting at least six times the scaffold's design load.

l. Load Handling Equipment (LHE) – Supported Personnel. Supported Personnel Work Platforms. See chapter 16 and 29 CFR 1926 Subpart CC. (22-8.l)

m. Mobile Elevating Work Platforms (MEWP). (22-8.m)

(1) All MEWPs must be designed and constructed according to ANSI, as appropriate.

(2) Operate, inspect, and maintain MEWPs according to the manufacturer's instructions.

(3) Maintain records of inspections conducted while the unit is at the work.

(4) Maintain a height-to-base width ratio of the scaffold during movement of 2:1 or less, according to the manufacturer's instructions.

(5) Maintain the elevating MEWPs manufacturer's operating manual readily available on the equipment.

(6) Do not operate MEWPs until the access door or chains are in the closed position.

(7) Use fall protection according to chapter 21 of this manual.

(8) Climbing of the rails is prohibited.

(9) All boom-supported MEWPs must be equipped with an alarm, or other suitable warning device, at the platform. The alarm must be in operable condition and must

automatically activate when the machine base is more than 5° out of level in any direction.

(10) Do not use MEWPs for work on energized electrical wiring and/or equipment.

(11) Only operate MEWPs from the ground position in an emergency (rescue), for maintenance, or when unoccupied.

(12) Lift controls must be located below the guardrail height. When lift controls are not located below the guardrail height, install an aftermarket guard.

n. Vehicle-Mounted Elevating and Rotating Work Platforms (Aerial Devices/Lifts). (22-8.n)

(1) Vehicle-mounted elevating and rotating work platforms (aerial lifts, to include articulating boom platforms/lifts (knuckle boom lifts), trailer-mounted boom lifts) must be designed and constructed according to ANSI/SAIA A92.2.

(2) Operate, inspect, test, and maintain vehicle-mounted elevating and rotating work platforms according to the manufacturer's instructions.

(a) Vehicle-mounted elevating and rotating work platforms must also comply with requirements in chapters 21 and 18.

(b) Maintain records of inspections conducted while the unit is at the work site.

(c) Maintain the aerial device's manufacturer's operating manual readily available in or on the vehicle.

(d) If the unit is considered rated, and used as an insulating device, maintain copies of the electrical insulating components and system tests conducted while the unit is at the work site.

(e) All required safety decals, labels, and signs must be in place and legible.

(3) Transporting.

(a) Do not move aerial lift trucks, to include cherry pickers, when the boom is elevated in a working position with personnel in the basket except for equipment that is specifically designed for this type of operation. When manufacturers allow mobile operation, the work site must be inspected for the following before movement occurs:

(a-1) Untamped earth fills (soft ground).

(a-2) Ditches.

(a-3) Drop-offs and floor obstructions.

(a-4) Debris.

(a-5) Overhead obstructions and electrical conductors.

(a-6) Weather conditions.

(a-7) The presence of unauthorized persons.

(b) Before moving an aerial lift, inspect the boom(s) to see that it is properly cradled and outriggers are in stowed positions, except as provided in paragraph 22-8.n(3) above.

(c) Secure aerial ladders in the lower traveling position by the locking device on top of the truck cab and the manually operated device at the base of the ladder before the truck is moved for highway travel.

(4) Operating Practices.

(a) Follow the manufacturer's instructions for control station operation (for example, primary versus secondary, upper versus lower).

(b) Set the brakes and position outriggers, when used, on pads or a solid surface.

(c) Install wheel chocks before using an aerial lift on an incline.

(d) Test lift controls each day prior to use to ensure safe working condition.

(e) Lift controls must be located below the guardrail height. When lift controls are not located below the guardrail height, install an after-market guard.

(f) Do not exceed boom and basket load limits specified by manufacturer.

(g) Articulating boom and extensible boom platforms, primarily designed as personnel carriers, must have both platform (upper) and lower controls.

(g-1) Upper controls must be in or beside the platform within easy reach of the operator.

(g-2) Lower controls must provide for overriding the upper controls.

(g-3) Controls must be plainly marked as to their function.

(h) Do not wear climbers (spikes) while performing work from an aerial lift.

(i) Do not alter in any manner the insulated portion of an aerial lift that might reduce its insulating value.

(j) Occupants must always stand firmly on the floor of the basket and must not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

o. Mast Climbing Work Platforms (MCWP). (22-8.o)

(1) Erect, use, inspect, test, maintain, and repair MCWPs according to ANSI A92.9, International Powered Access Federation (IPAF)/SAIA, and the manufacturer's instructions.

(2) Conduct a pre-use inspection prior to erecting the work platform according IPAF/SAIA and the manufacturer's instructions.

(a) Conduct an overhead inspection to ensure that the MCWP will not come in contact with any obstructions while moving up or down the mast. Give special attention to high voltage conductors. Once the voltage of the line(s) is established, adhere to the minimum safe approach distances in table 11-4.

(b) Conduct an inspection of the ground to ensure that there are no obstacles around the MCWP and in the path of travel (if the unit is on a mobile chassis) such as holes, drop-offs, debris, ditches, or soft fill. For static and mobile units, compaction will be sufficient to support the static and live loads for the configuration. The perimeter around the base of the unit, matching the length and width of the platform area above, must be identified as restricted access by use of danger signs, tape, fences, or other suitable means.

(c) Daily maintenance and inspections must be performed and documented by a CP according to paragraph 22-5.d.

(3) Only designated and trained users can operate the MCWP. Training records must be maintained for at least three years and maintained onsite. All personnel on the MCWP must be trained according to paragraph 22-3.

(4) Do not raise the MCWP on uneven or sloped surfaces unless outriggers are used to level the MCWP and the ground is suitable to support the load.

(5) Raise the MCWPs according to the manufacturer's recommended free-standing height and outrigger requirement and loading recommendations. Use

outriggers according to the manufacturer's recommendations. The unit must be level before raising the platform (mast should be plumb and level before vertical movement of platform).

Note. Not all MCWPs are designed with freestanding capability. Check the machine and manual to see if the machine being operated has a freestanding height.

(6) If the unit is on a powered chassis, lower the MCWP to its lowest position prior to being moved. Additionally, move all material and tools from the platform, fully extend and open the outriggers and raise the jacks no more than 1 inch (2.5 cm) from the ground. When moved into its new working position, the unit must be set up and leveled again before it is elevated. The work platform must remain horizontal within 2 degrees during normal movement of the platform.

(7) Do not drive a MCWP with the platform elevated or personnel on the platform. Follow the manufacturer's instructions when moving a MCWP to determine the safe mast height for ground conditions, ground slope, and overhead obstructions.

(8) Tie MCWPs to the building (or structure) according to manufacturer's instructions unless it is designed to be freestanding. A QP must demonstrate the correct anchoring method based on tensile, shear, and torsion forces according to the manufacturer's instructions and with respect to the strength of the structure to be tied to, following all relevant requirements on installation from the anchor manufacturer's data.

(9) Do not use ladders or structures of any kind to increase the size or working height of platform unless specifically designed by the manufacturer for the intended use and all fall hazards have been controlled.

(10) Access.

(a) Climbing of braces and guardrails is prohibited. When access ladders, including masts designed as ladders, exceed 20 feet (6.1 m) in height, use fall protection. (See chapter 21)

(b) All access gates must either close automatically or be electronically interlocked to prevent operation of the MCWP unless they are closed. Do not use chains or ropes as access gates.

(c) Prior to use at elevations of 20 feet (6.1 m) or more, develop an emergency egress plan to evacuate workers from a MCWP that gets caught in an elevated position 20 feet (6.1 m) or more above the ground. If that plan includes descending the mast, all employees working on the MCWP must be provided fall arrest equipment and must be trained in its use. (See chapter 21)

(11) Do not raise the MCWP in windy or gusty conditions.

(a) Follow the manufacturer's instructions to determine maximum in-service wind speed conditions. A copy of the operator's manual must be available on the jobsite.

(b) Account for loads and forces according to the manufacturer's instructions.

(12) Do not alter or modify in any way MCWPs unless approved by the manufacturer and performed by a QP.

(13) Do not use damaged or malfunctioning machines. Discontinue operation of damaged equipment until the unit is repaired.

(14) MCWPs must be equipped with a permanently installed device on the work platform to switch off the work platform and secure it from unauthorized use.

(15) Planking and decking must meet paragraph 22-8.c and 29 CFR 1926.451.

(16) Guarding

(a) All open sides of the platform must be equipped with a guardrail which can be securely fastened in place. Secure guardrails according to the manufacturer's instructions. Guardrails must be able to withstand, without failure, a force of 300 lbs. (136.1 kg), applied in any outward or downward direction.

(b) If the MCWP is erected towards a wall and the distance is more than 14 inches (35.6 cm), a guardrail is required. The maximum distance between wall and platform may increase to 18 inches (45.7 cm) for plastering and lathing operations. When the horizontal distance between the wall and platform is less than 14 inches (35.6 cm), then a guardrail is not required.

(c) Any MCWP with a travel speed of more than 15 fpm (4.6 m/min) must include a mast guard around at least three sides of the mast. The guard must provide protection from not more than 1 inch (2.5 cm) above the platform floor to a minimum height of 6.5 feet (1.8 m) above the platform floor and will have no opening larger than 1 in^2 (2.5 cm^2). (See ANSI A92.9)

p. Roofing Bracket Scaffolds (see 29 CFR 1926.452). (22-8.p)

q. Stilts (see 29 CFR 1926.452). (22-8.q)

r. Turbine Maintenance Platforms (TMPs). (22-8.r)

(1) Design.

(a) TMPs must be designed and/or certified by an RPE. Existing TMPs must be certified prior to the next use. There is a grace period of 6 months from the effective date of this manual.

(b) TMPs must be designed to support their own weight plus four times the maximum intended load.

(c) A data plate must be attached or the documentation showing the design must be readily available onsite. The RPE must be listed on the drawings and calculations for the platform, not on the data plate. The data plate, when used, must include the following:

(c-1) Descriptive name indicating intended usage.

(c-2) Assembled weight of TMP.

(c-3) Total maximum live load (pounds).

(c-4) Total maximum distributed live load (pounds per square foot).

(c-5) Date of fabrication.

(c-6) Name of fabricator.

(c-7) Any load restrictions or usage limitations.

(d) If wire rope is used to either support the platform after installation or to raise the platform while occupied, the wire rope must have a safety factor of six.

(e) Deflections in structural members and structural systems under appropriate service load combinations must not impair the serviceability of the structure.

(f) If hooks are used to support the platform in its final position, they must be designed with a positive means of securing them to prevent the hooks from being disengaged.

(g) The decking/platform must be designed so that the space between adjacent obstacles or structures and the space between the platform is no more than 9.5 inches (24.1 cm) wide, except where the user can demonstrate that a wider space is necessary. Where gaps exceed 9.5 inches (24.1 cm), implement fall protection according to chapter 21.

(h) Working surfaces must be slip-resistant.

(2) Testing. Immediately after fabrication and after any modification of the structural members, the platform must be proof tested to 100% of its rated capacity according to paragraph 22-5.e.

(3) Assembly/Disassembly.

(a) The TMP must be positively attached prior to use. Platform components must be supported and secured such that each component is stable in all anticipated load conditions. When attachment points are welded, they must be either welded by an AWS certified welder or a pull test conducted according to RPE specifications. See chapter 10 for structural welding requirements and qualifications.

(b) Raising and lowering the platform, when occupied by personnel, will only be done with rated grip hoists or other lifting equipment rated for lifting personnel. Do not use chain falls to lift personnel unless an independent fall protection system is used. (See chapter 21)

s. Forklift/Powered Industrial Truck (PIT) – Mounted Work Platforms. (22-8.s)

(1) Do not use forklifts/PITs to support work platforms unless there is no other practical method. If a rough terrain (RT) forklift must be used, all the conditions must be met.

(2) The manufacturer must specifically allow the specific machine to lift personnel. Maintain the operator's manual at the work site on the forklift.

(3) Maintain the manufacturer's specifications onsite. These specifications must reference ANSI B56.6.

(a) A data plate may be used in lieu of the manufacturer's specifications if it references ANSI B56.6.

(b) If the platform is not manufactured by or for the company that manufactures the forklift, a letter must be obtained from the forklift manufacturer that states the machine is compatible with the platform design. This letter must be kept onsite and a copy provided to the USACE supervisor/KO or COR.

(4) Securely attach the platform to the lifting carriage and forks.

(5) Secure the lifting carriage and forks from pivoting forward.

(6) If the truck is equipped with a rotator, deactivate the rotator.

(7) Provide personnel protection from moving parts while in their normal working positions.

(8) Provide overhead protection as necessary for the operating conditions.

(9) The lifting operation must be done smoothly throughout the entire range of the lift.

(10) All lift limiting devices and latches, if so equipped, must be functional.

(11) The operator must verify a firm footing before lifting personnel.

(12) All personnel must use a fall restraint system according to chapter 21 and must maintain a firm footing on the platform at all times.

(13) Do not tilt the platform forward or rearward.

(14) Lower the platform to the ground level for personnel to enter and exit.

(15) The operator must remain at the controls whenever personnel are elevated.

(16) Do not move the forklift horizontally while occupied.

(17) Before elevating personnel, forklift travel controls must be in neutral and the parking brake set.

(18) The operator must verify that the mast or boom travel is vertical and must not operate on a slope unless the RT forklift is level.

(19) The operator must verify that the path of the platform travel is clear of hazards, such as electrical wires, overhead obstructions, scaffolding, storage racks, and other obstacles.

(20) Before elevating personnel, the work area must be marked to warn of work by elevated personnel.

(21) Driving a forklift equipped with a personnel work platform in a raised position or with personnel on the platform is forbidden.

(22) Before raising or lowering the platform, the operator must alert the personnel on the platform and then move the platform smoothly and with caution as requested by the occupants.

(23) The combined weight of the platform, load, and personnel must not exceed one-third of the capacity at the related load center position as indicated on the information plate(s) of the RT forklift truck.

t. Work Stands (Portable Work Platforms). (22-8.t)

(1) Work stands must be designed according to either ANSI A14.2 (aluminum) or ANSI A14.5 (plastic/fiberglass).

(2) The working height of work stands must not exceed 4 feet (1.2 m).

(3) The load rating must be clearly and legibly marked on the work stand. Do not load the work stand beyond the manufacturer's rated capacity. The maximum intended load includes the worker and all tools and supplies.

(4) When work stands are used adjacent to stairs or ramps where a fall to a different level could occur, use guardrails or another other fall protection method. See chapter 21 for fall protection requirements and options.

(5) Inspect work stands for visible defects on a daily basis. Maintain work stands so they remain free of structural damage.

(6) Do not use job-built work stands. Do not use sawhorses as work stands.

u. Trestle Ladder Scaffolds. (22-8.u)

(1) Do not place scaffold platforms higher than the second-highest rung or step of the ladder supporting the platform.

(2) All ladders used in step, platform, and trestle ladder scaffolds must:

(a) Meet or exceed 29 CFR 1926 Subpart L.

Note. Job-made ladders are not permitted.

(b) Place, fasten, or equip the ladder to prevent slipping.

(3) Do not bridge scaffolds one to another.

(4) Climbing and Working Locations. Climb or work with the body near the middle of the step or rung. Climbing higher than the step or rung indicated on the label marking the highest standing level of a ladder. Do not step or stand on any of the following:

(a) A ladder top cap or the top step of the step or trestle ladder or the bucket or pail shelf of a self-supporting ladder.

(b) The rear braces of a self-supporting ladder, unless designed and recommended for that purpose by the manufacturer.

(c) The top step of the extension section of an extension trestle ladder.

(d) The top cap or top step of a combination ladder when it is used as a self-supporting ladder.

22-9. Figures and Tables.

Table 22-1
Form Scaffolds - Minimum Design Criteria for Wooden Bracket Form Scaffolds

Members	Dimensions
Bracket uprights	2 x 4 inches or 2 x 6 inches (5.1 x 10.2 cm or 5.1 x 15.2 cm)
Bracket support ledgers	2 x 6 inches (5.1 x 15.2 cm)
Maximum bracket width	3 feet 6 inches (1.1 m)
Bracket braces	1 x 6 inches (2.5 x 15.2 cm)
Guardrail post	2 x 4 inches (5.1 x 10.2 cm)
Guardrail height	36 to 45 inches (91.4 to 114.3 cm)
Midrail	1 x 6 inches (2.5 x 15.2 cm)
Toeboards	1 x 6 inches (2.5 x 15.2 cm)
Bracket upright spacing	8 feet (2.4 m) (on centers)

Table 22-2
Form Scaffolds - Minimum Design Criteria for Light-Duty Figure-Four Form Scaffolds

Members	Dimensions
Bracket uprights	2 x 4 inches or 2 x 6 inches (5.1 x 10.2 cm or 5.1 x 15.2 cm)
Bracket outrigger ledgers	(2) 1 x 6 inches (2.5 x 15.2 cm)
Bracket braces	(2) 1 x 6 inches (2.5 x 15.2 cm)
Maximum length of ledgers	3 feet 6 inches (1.1 m) (unsupported)
Bracket upright spacing	8 feet (2.4 m) (on centers)

Table 22-3
Minimum Dimensions for Horse Scaffold Members

Members	Dimensions
Horizontal members of bearers	3 x 3.9 inches (7.6 x 10 cm)
Legs	2 x 3.9 inches (5.1 x 10 cm)
Longitudinal brace between legs	1 x 5.9 inches (2.5 x 15 cm)
Gusset brace at top of legs	1 x 7.9 inches (2.5 x 20.1 cm)
Half diagonal braces	2 x 3.9 inches (5 x 10 cm)