

SECTION 22

WORK PLATFORMS

22.A GENERAL

22.A.01 Manufactured work platforms shall be erected, used, inspected, tested, maintained, and repaired in accordance with ANSI A10.8 and the manufacturer's recommendations as outlined in the operating manual or in accordance with guidance from the Scaffolding, Shoring, and Forming Institute. A copy of the manufacturer's recommendations (operating manual) or guidance from the Scaffolding, Shoring, and Forming Institute shall be available at the work site.

22.A.02 Work platforms shall comply with appropriate access and fall protection requirements of Section 21.

- a. All requirements of 21.A shall be applied to work platforms and means of access.
- b. Standard railing and handrails for work platforms shall be in compliance with the requirements of Section 21 and personal fall protection devices and safety nets shall be in compliance with the requirements of 21.C.
- c. Ladders used as work platforms shall be in compliance with the requirements of 21.D.

22.A.03 Prior to commencing any activity that requires work in elevated areas, all provisions for access and fall protection shall be delineated in the AHA, accepted by the GDA, for the activity.

22.A.04 The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

EM 385-1-1

3 Nov 03

- a. Scaffolds, platforms, or temporary floors shall be provided for all work except that which can be done safely from the ground or similar footing.
- b. Ladders may be used as work platforms only when use of small hand tools or handling of light material is involved.
- c. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
- d. Emergency descent devices shall not be used as working platforms.

22.A.05 Erection, moving, dismantling, or altering of work platforms shall be under the supervision of a competent person.

22.A.06 Work platforms shall not be erected or used in the immediate vicinity of power lines or electrical conductors until such are insulated, de-energized, or otherwise rendered safe against accidental contact. > **See 11.E.**

22.A.07 Where persons are required to work or pass under a working platform, a screen (consisting of No. 18 gauge US Standard wire 0.5-in (1.2-cm) mesh or the equivalent) shall be provided between the toe board and the guardrail and extending over the entire opening.

22.B SCAFFOLDS - GENERAL

22.B.01 Capacities.

- a. Scaffolds and their components shall meet the requirements contained in ANSI A10.8 and be capable of supporting without failure at least 4 times the maximum anticipated load.
- b. Scaffold system components that are subjected to a bending moment (such as outrigger beams with suspended scaffold and counterweights) shall be capable of providing a resisting moment of at least four times the tipping moment.

22.B.02 Design.

- a. The dimensions of the members and materials used in the construction of various working platforms or scaffolds shall conform to the sizes shown in the ANSI A10.8 tables.
- b. Factory-fabricated scaffolds and components shall be designed and fabricated in accordance with 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 shall prevail.

22.B.03 Scaffolds shall be plumb and level.

22.B.04 Scaffolds (other than suspended scaffolds) shall bear on base plates upon mudsills or other adequate foundation.

22.B.05 Working levels of work platforms shall be fully planked or decked.

22.B.06 Planking.

- a. All planking of platforms shall be either overlapped (minimum 12 in (30.4 cm) or secured from movement.
- b. Scaffold planks shall extend over their end supports not less than 6 in (15.2 cm) (unless the planking is manufactured with restraining hooks or equivalent means) nor more than 12 in (30.4 cm).
- c. Planking on scaffolds shall extend from the toe board to not more than 14 in (35.5 cm) from the face of the building or structure unless standard guardrails are installed or personal fall protection systems are used. The maximum distance for outrigger scaffolds shall be 3 in (7.6 cm).

EM 385-1-1

3 Nov 03

d. Planking shall be supported or braced to prevent excessive spring or deflection and secured and supported to prevent loosening, tipping, or displacement.

e. When a scaffold materially changes its direction, the platform planks shall be laid to prevent tipping.

(1) The planks that meet the corner bearer at an angle shall be laid first, 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, and

(2) The planking running in the opposite direction at an angle shall be laid so as to extend over and rest on the first layer of planking.

22.B.07 Work platforms shall be securely fastened to the scaffold.

22.B.08 Access.

a. An access ladder or equivalent safe access shall be provided.

b. Where a built-in ladder is part of a scaffold system, it shall conform to the requirements for ladders.

c. Climbing of braces shall be prohibited.

22.B.09 When the scaffold height exceeds four times the minimum scaffold base dimension (and including the width added by outriggers, if used), the scaffold shall be secured to the wall or structure.

a. The first vertical and horizontal tie shall be placed at this point.

- b. Vertical ties shall be repeated at intervals not greater than 26 ft (7.9 m) with the top tie placed no lower than four times the base dimension from the top of the scaffold.
- c. Horizontal ties shall be placed at each end and at intervals not greater than 30 ft (9.1 m).

22.B.10 The use of brackets on scaffolds shall be prohibited unless the tipping effect is controlled

22.B.11 Use of the following types of scaffolding are permitted if they are designed and constructed in accordance with 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, and
- h. Carpenter's bracket scaffolds.

22.C METAL SCAFFOLDS AND TOWERS

22.C.01 Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that required by 22.B.01.

22.C.02 The sections of metal scaffolds shall be securely connected and all braces shall be securely fastened.

EM 385-1-1

3 Nov 03

22.C.03 A ladder or stairway shall be provided for access and shall be affixed or built into all metal scaffolds and so located that, when in use, it will not have a tendency to tip the scaffold.

22.C.04 Tube and coupler scaffolds.

a. Tube and coupler scaffolds shall have posts, runners, and bracing of nominal 2-in (5-cm) (outside diameter) steel tubing or pipe: other structural metals, when used, must be designed to carry an equivalent load. The size of bearers (outside diameter) and the spacing of posts shall meet the requirements contained in ANSI A10.8.

b. Tube and coupler scaffolds shall be limited in heights and working levels to those permitted in ANSI A10.8. Drawings and specifications for tube and coupler scaffolds that exceed the limitations in ANSI A10.8 shall be designed by a registered engineer.

c. All tube and coupler scaffolds shall be constructed to support four times the maximum intended loads, as set forth by ANSI A10.8 or as specified by a professional structural engineer.

d. Runners shall be erected along the length of the scaffold and shall be located on both the inside and the outside posts at even heights.

(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, extra runners shall be installed to compensate.

(2) Runners shall be interlocked to form continuous lengths and coupled to each post.

(3) The bottom runners shall be located as close to the base as possible.

(4) Runners shall be placed not more than 6 ft - 6 in (1.9 m) on center.

e. Bearers.

(1) Bearers shall be installed transversely between posts.

(2) When coupled to the post, the inboard coupler shall bear directly on the runner coupler. When coupled to the runners, the couplers shall be kept as close to the post as possible.

(3) Bearers shall extend beyond the posts and runners and shall provide full contact with the coupler.

f. Bracing across the width of the scaffold shall be installed at the ends of the scaffold at least every fourth level vertically and repeated every third set of posts horizontally.

(1) Such bracing shall extend diagonally from the outer post or runner at this level upward to the inner post or runner at the next level.

(2) Building ties shall be installed adjacent to bracing.

g. Longitudinal diagonal bracing across the inner and outer rows of poles shall be installed at approximately a 45° angle in both directions from the base of the end post upward to the extreme top of the scaffold.

(1) Where the longitudinal length of the scaffold permits, such bracing shall be repeated beginning at every fifth post.

(2) On scaffolds where the length is shorter than the height the longitudinal bracing shall extend 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.

EM 385-1-1

3 Nov 03

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

22.C.05 Metal frame scaffolds.

- a. Spacing of tubular welded panels or frames shall be consistent with the loads imposed.
- b. Scaffolds shall be properly braced by cross, horizontal, or diagonal braces (or combination of these) to secure vertical members together laterally, and the cross braces shall be of such length as will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections shall be made secure.
- c. Scaffold legs shall be set on adjustable bases or plain bases placed on mudsills or other foundations adequate to support the maximum rated loads.
- d. Frames shall be placed one on top the other with coupling or stacking pins to provide vertical alignment of the legs.
- e. Where uplift may occur, panels shall be locked together vertically by pins or other equivalent suitable means.
- f. Drawings and specifications for all frame scaffolds over 125 ft (38.1 m) in height above the base plates shall be designed by a registered engineer.

22.C.06 Manually propelled mobile scaffolds.

- a. All wheels and casters on rolling scaffolds shall have a positive locking device, securely fastened to the scaffold, to prevent accidental movement.
- b. Casters or wheels shall be locked when scaffold is in use.

- c. The force necessary to move the mobile scaffold shall be applied as close to the base as practical and provision shall be made to stabilize the tower during movement from one location to another.
- d. Rolling scaffolds shall be used only on firm, level, clean surfaces.
- e. Free-standing mobile scaffold working platform heights shall not exceed three times the smallest base dimension.
- f. No person shall be allowed to ride on manually propelled scaffolds unless all of the following conditions exist:
 - (1) The ground surface is within 3° of level and free from pits, holes, or obstructions;
 - (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;
 - (3) The wheels are equipped with rubber or similar resilient tires; and
 - (4) All tools and materials are secured or removed from the platform before the scaffold is moved.

22.D SCAFFOLDS - WOOD POLE

22.D.01 All wood scaffolds 60 ft (18.2 m) or less in height shall be constructed in accordance with Table 22-1: wood scaffolds over 60 ft (18.2 m) high shall be designed by a licensed professional engineer and constructed in accordance with such design.

TABLE 22-1
WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum nominal size and maximum spacing of members of single pole scaffolds

	Light duty		Medium duty	Heavy Duty
Maximum height of scaffold	20 ft (6.1m)	60 ft (18.2 m)	60 ft (18.2 m)	60 ft (18.2 m)
Maximum uniformly distributed load	25 psf	25 psf	50 psf	75 psf
Poles or uprights	2 in x 4 in (5.1 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)
Pole spacing, longitudinal	6 ft (1.8 m)	10 ft (3.0 m)	8 ft (2.4 m)	6 ft (1.8 m)
Maximum width of scaffold	5 ft (1.5 m)	5 ft (1.5 m)	5 ft (1.5 m)	5 ft (1.5 m)
Bearers or putlogs	2 in x 4 in (5.1 cm x 10.1 cm) + 2 in x 6 in (5.1 cm x 15.2 cm) (rough) or 3 in x 4 in (7.6 cm x 10.1 cm) (rough)++	2 in x 4 in (5.1 cm x 10.1 cm) + 2 in x 6 in (5.1 cm x 15.2 cm) (rough) or 3 in x 4 in (7.6 cm x 10.1 cm) (rough)++	2 in x 9 in (5.1 cm x 22.8 cm) (rough) or 3 in x 4 in (7.6 cm x 10.1 cm) (rough)	2 in x 9 in (5.1 cm x 22.8 cm) (rough) or 3 in x 5 in (7.6 cm x 12.7 cm) (rough)

All members are used on edge

+ to 3 ft (.9 m) width

++ to 5 ft (1.5 m) width

TABLE 22-1 (CONTINUED)

WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum nominal size and maximum spacing of members of single pole scaffolds

	Light duty		Medium duty	Heavy Duty
Spacing of bearers or putlogs			8 ft (2.4 m)	6 ft (1.8 m)
Ledgers	1 in x 4 in (2.5 cm x 10.1 cm)	1-1/4 in x 9 in (3.1 cm x 22.8 cm)	2 in x 9 in (5 cm x 22.8 cm) (rough)	2 in x 9 in (5 cm x 22.8 cm) (rough)
Vertical spacing of horizontal members	7 ft (2.1 m)	7 ft (2.1 m)	9 ft (2.7 m)	6 ft 6 in (1.9 m)
Bracing, horizontal	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 6 in (2.5 cm x 15.2 cm) or 1-1/4 in x 4 in (3.1 cm x 10.1 cm)	2 in x 4 in (5 cm x 10.1 cm)
Bracing, diagonal	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	2 in x 4 in (5 cm x 10.1 cm)
Tie-ins	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)

All members are used on edge

+ to 3 ft (.9 m) width

++ to 5 ft (1.5 m) width

TABLE 22-1 (CONTINUED)
WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum Nominal Size and Maximum Spacing of Members of
Independent Pole Scaffolds

	Light duty		Medium duty	Heavy Duty
Maximum height of scaffold	20 ft (6 m)	60 ft (18.2 m)	60 ft (18.2 m)	60 ft (18.2 m)
Maximum uniformly distributed load	25 psf	25 psf	50 psf	75 psf
Poles or uprights	2 in x 4 in (5 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)	4 in x 4 in (10.1 cm x 10.1 cm)
Pole spacing, longitudinal	6 ft (1.8 m)	10 ft (3 m)	8 ft (2.4 m)	6 ft (1.8 m)
Maximum width of scaffold	6 ft (1.8 m)	10 ft (3 m)	6 ft (1.8 m)	6 ft (1.8 m)
Bearers	2 in x 4 in (5 cm x 10.1 cm) + 2 in x 6 in (5 cm x 15.2 cm) (rough) or 3 in x 4 in (7.6 cm x 10.1 cm) (rough)++	2 in x 4 in (5 cm x 10.1 cm) + 2 in x 6 in (5 cm x 15.2 cm) (rough) or 3 in x 4 in (7.6 cm x 10.1 cm) (rough)++	2 in x 9 in (5 cm x 22.8 cm) (rough) or 2 in x 10 in (5 cm x 25.4 cm) (rough)	2 in x 9 in (5 cm x 22.8 cm) (rough)
Spacing of bearers or putlogs			8 ft (2.4 m)	6 ft (1.8 m)

All members are used on edge
+ to 3 ft (.9 m) span.
++ to 10 ft (3 m) span
* these data are based on one working level and two additional planked levels

TABLE 22-1 (CONTINUED)

**WOOD POLE SCAFFOLD HEIGHT AND LEVEL LIMITS
Minimum Nominal Size and Maximum Spacing of Members of
Independent Pole Scaffolds**

	Light duty		Medium duty	Heavy Duty
Ledgers	1 in x 4 in (2.5 cm x 10.1 cm)	1-1/4 in x 9 in (3.1 cm x 22.8 cm)	2 in x 9 in (5 cm x 22.8 cm) (rough)	2 in x 9 in (5 cm x 22.8 cm) (rough)
Vertical spacing of horizontal members	7 ft (2.1 m)	7 ft (2.1 m)	6 ft (1.8 m)	4 ft 6 in (1.2m)
Bracing, horizontal	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 6 in (2.5 cm x 15.2 cm) or 1 1/4 in x 4 in (3.1 cm x 10.1 cm)	2 in x 4 in (5 cm x 10.1 cm)
Bracing, diagonal	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	2 in x 4 in (5 cm x 10.1 cm)
Tie-ins	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)	1 in x 4 in (2.5 cm x 10.1 cm)

All members are used on edge

+ to 3 ft (.9 m) span

++ to 10 ft (3 m) span

* these data are based on one working level and two additional planked levels

EM 385-1-1

3 Nov 03

22.D.02 Bracing.

- a. Diagonal bracing shall be provided to prevent the poles from moving in a direction parallel with the wall of the building or from buckling.
- b. Full diagonal bracing shall be erected across the entire face of pole scaffolds in both directions. Braces shall be spliced at the poles. The inner row of poles on medium and heavy-duty scaffolds shall be braced in a similar manner.
- c. Cross bracing shall be provided between inner and outer sets of poles in independent pole scaffolds.
- d. The free ends of pole scaffolds shall be cross braced.

22.D.03 Splices.

- a. Where wood poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section.
- b. Splice plates shall be provided on two adjacent sides and shall be not less than 4 ft (1.2 m) in length, overlapping the abutted ends equally, and have the same width and not less than the cross sectional area of the pole. The splice shall be capable of developing strength in any direction equal to the spliced members.

22.D.04 Ledgers and bearers.

- a. Ledgers and bearers shall be installed on edge.
- b. Ledgers and bearers shall not be spliced between poles.
- c. Ledgers shall be long enough to extend over a minimum of two poles and shall be reinforced by bearing blocks nailed to the side of the pole to form a support for the ledger.

- d. Bearers shall be long enough to project at least 3 in (7.6 cm) over the ledgers of the inner and outer rows of poles for support.
- e. Every wooden bearer on single pole scaffolds shall be reinforced with a 3/16-in x 2-in (.47-cm x 5-cm) steel strip, or equivalent, secured to its lower edge throughout the length.

22.D.05 Independent pole scaffolds shall be set as near to the wall of the building as practical.

22.D.06 All pole scaffolds shall be securely guyed or tied to the structure. Where the height or length exceeds 25 ft (7.6 m), the scaffold shall be secured at intervals not greater than 25 ft (7.6 m) vertically and horizontally.

22.E SCAFFOLDS - SUSPENDED

22.E.01 Suspended scaffolds shall be designed, constructed, operated, inspected, tested, and maintained as specified in the operating manual for the device.

22.E.02 Inspections.

- a. Suspended scaffold systems shall be inspected prior to being placed in service to determine that the system conforms to this manual and the manufacturer's specifications.
- b. Every suspended scaffold shall be tested with twice the maximum anticipated load before being put into operation.
> **See 22.B.01.**
- c. Each hoist shall be inspected before, and trial operated after, every installation and re-rigging in accordance with the manufacturer's specifications.
- d. Connection and anchorage systems of suspended scaffold shall be inspected at the beginning of each shift.

EM 385-1-1

3 Nov 03

e. All wire ropes, fiber and synthetic ropes, slings, hangers, hoists, rigging, fall protection equipment, platforms, anchorage points and their connections, and other supporting parts shall be inspected before every installation, daily thereafter, and periodic while the scaffold is in use.

f. Governors and secondary brakes for powered hoists shall be inspected and tested per the manufacturer's recommendations: at the minimum, inspections shall be made annually.

(1) Inspections and tests shall include a verification that the initiating device for the secondary braking operates as intended.

(2) A copy of the latest inspection and test report shall be maintained on the job site.

g. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

22.E.03 Only personnel trained in the use of the suspended work platform shall be authorized to operate it. Training shall include:

a. Reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents, and

b. Reading and understanding all decals, warnings, and instructions on the device.

22.E.04 All parts of all suspended scaffolds shall have a minimum safety factor of 4. A minimum safety factor of 6 is required for support ropes.

22.E.05 Support ropes.

- a. Support ropes shall be attached at the vertical centerline of the outrigger and the attachment shall be directly over the hoist machine.
- b. Support ropes shall be vertical for their entire length. The scaffold shall not be swayed nor the support ropes fixed to any intermediate points to change the original path of travel.
- c. Support ropes shall have the fixed end equipped with a proper size thimble and secured by eye splicing or equivalent means. Free ends shall be brazed or secured to prevent fraying.
- d. The wire rope for traction hoists shall be of such length that the operator may 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, provision shall be made to prevent the hoist from running off the wire rope.
- e. On winding drum type hoists, running ends of suspension ropes shall be attached by positive means to the hoisting drum and at least four wraps of the rope shall remain on the drum at all times.
- f. Support ropes shall be capable of resisting chemicals or conditions to which they are exposed.
- g. No welding, burning, riveting, or open flame work shall be performed on any platform suspended by fiber or synthetic rope.
- h. Defective or damaged rope shall not be used as lifelines or suspension lines. The repairing of wire rope is prohibited.

22.E.06 All suspension scaffold support devices such as outrigger beams, cornice hooks, parapet clamps, or similar devices shall:

EM 385-1-1

3 Nov 03

- a. Be made of mild steel, wrought iron, or equivalent materials;
- 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; and
- 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 shall be equivalent in strength to the hoisting rope.

22.E.07 Outrigger beams.

- a. Outrigger beams shall be made of structural metal and shall be restrained to prevent movement.
- b. The inboard ends of outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except mason's multiple point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.
- c. Before use, direct connections shall be evaluated by a competent person who shall affirm that the supporting surfaces are capable of supporting the loads to be imposed. Mason's multiple point adjustable suspension scaffold connections shall be designed by a licensed engineer experienced in scaffold design.
- d. Counterweights shall be made of non-flowable solid material, shall be secured to the outrigger beams by mechanical means, and shall not be removed until the scaffold is disassembled.
- e. Outrigger beams shall be secured by tiebacks equivalent in strength to the suspension ropes. Tiebacks shall be secured to a structurally sound portion of the building or structure and shall be installed parallel to the centerline of the beam.

- f. Outrigger beams shall be provided with stop bolts or shackles at both ends.
- g. When channel iron beams are used in place of I-beams, the channels shall be securely fastened together with the flanges turned outward.
- h. Outrigger beams shall be installed with all bearing supports perpendicular to the beam centerline.
- i. Outrigger beams shall be set and maintained with the web in a vertical position.
- j. Where a single outrigger beam is used, the steel shackle or clevises with which the wire ropes are attached to the beam shall be placed directly over the hoisting machines.

22.E.08 Hoisting machines

- a. Hoisting machines shall be of a type tested and listed by a nationally recognized testing laboratory.
- b. Each hoist shall contain a name plate(s) stating:
 - (1) Manufacturer's name,
 - (2) Maximum load rating,
 - (3) Identification number, and
 - (4) Wire rope specifications.
- c. Powered hoists shall be electric-, air-, hydraulic-, or propane-powered. Gasoline-powered hoists are prohibited.
- d. All powered hoists shall be equipped with speed reducers and shall be provided with a primary brake and a secondary brake.

EM 385-1-1

3 Nov 03

- (1) The primary brake shall automatically engage whenever power is interrupted or whenever the operator ceases to apply effort;
 - (2) The secondary brake shall stop and hold the hoist under over speed or abnormal conditions. Every secondary brake shall be periodically tested under simulated conditions in accordance with the manufacturer's recommendations.
- e. Each powered hoist shall have its own separate control.
- (1) If the control is of the push-button type, it shall be constant pressure;
 - (2) If the control is of the fixed-position type, it shall have provision for automatic locking when in the off position, or shall be guarded against accidental actuation; and
 - (3) If the control is of the level 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.
- (1) During manual operation, a means shall be provided to make the prime mover inoperative.
 - (2) Instruction shall be provided advising personnel to disconnect the power source before using a manual crank.
- g. Manually-operated hoists.
- (1) Manual operation shall provide a means to prevent rapid handle movement or fast unspooling. Mechanisms used to allow fast unspooling during the erection process shall not be in place on the scaffold.

- (2) In the event a controlled descent device is used, it shall not bypass the secondary brake.
- (3) All winding drum hoists shall be provided with a driving pawl and a locking pawl that automatically engages when the driving pawl is released.
- (4) Gripping-type hoists shall be designed so that the hoist is engaged on the suspension rope at all times, including all travel actuations of the operating lever.
- (5) Each winding drum hoist shall be provided with a positive means of attachment of the suspension hoist. The drum attachment shall develop a minimum of four times the rated capacity of the hoist.
- (6) Each hoist shall require a positive crank force to descend.

22.E.09 Platforms.

- a. Light metal platforms, when used, shall be of a type tested and listed by a nationally-recognized testing laboratory.
- b. Ladder-type platforms.
 - (1) Ladder-type platforms shall be constructed in accordance with Table 22-2.
 - (2) The side stringer for ladder-type platforms shall be of clear straight-grained spruce or materials of equivalent strength and durability.
 - (3) The rungs shall be of straight-grained oak, ash, or hickory, at least 1-1/8 in (2.8 cm) in diameter, with 7/8-in (2.2-cm) tenons mortised into the side stringers at least 7/8 in (2.2 cm).

TABLE 22-2
LADDER-TYPE PLATFORMS

Component	Length of platform (feet, m)				
	12 (3.7)	14 & 16 (4.3 & 4.9)	18 & 20 (5.5 & 6.1)	22 & 24 (6.7 & 7.3)	28 & 30 (8.5 & 9.1)
Side stringers, minimum cross sections (finished sizes, inches,):					
at ends	1-3/4 x 2-3/4 (4.4 x 6.9)	1-3/4 x 2-3/4 (4.4 x 6.9)	1-3/4 x 3 (4.4 x 7.6)	1-3/4 x 3 (4.4 x 7.6)	1-3/4 x 3-1/2 (4.4 x 8.9)
at middle	1-3/4 x 3-3/4 (4.4 x 9.5)	1-3/4 x 3-3/4 (4.4 x 9.5)	1-3/4 x 4 (4.4 x 10.1)	1-3/4 x 4-1/4 (4.4 x 10.8)	1-3/4 x 5 (4.4 x 12.7)
Reinforcing strips	(1)	(1)	(1)	(1)	(1)
Rungs	(2)	(2)	(2)	(2)	(2)
Tie rods: number (minimum) diameter (minimum) (in/cm)	3 1/4 (0.6)	4 1/4 (0.6)	4 1/4 (0.6)	5 1/4 (0.6)	6 1/4 (0.6)
Flooring, minimum finished sizes (in/cm)	1/2 x 2-3/4 (1.2 x 6.9)	1/2 x 2-3/4 (1.2 x 6.9)	1/2 x 2-3/4 (1.2 x 6.9)	1/2 x 2-3/4 (1.2 x 6.9)	1/2 x 2-3/4 (1.2 x 6.9)

NOTE:

(1) A 1/8 x 7/8 in (0.3 x 2.2 cm) steel reinforcing strip or its equivalent shall be attached to the side or underside, full length.

(2) Rungs shall be 1-1/8 in (2.8 cm) diameter tenons and the maximum spacing shall be 12 in (30.4 cm) center to center.

(4) The stringers shall be tied with tie rods not less than 1/4 in (0.6 cm) diameter passing through the stringers and riveted up tight against washers on both ends.

(5) The flooring strips shall be spaced not more than 5/8 in (1.5 cm) apart except at the side rails where the space may be 1 in (2.5 cm).

c. Plank platforms.

(1) Plank platforms shall be composed of not less than nominal 2-in x 10-in (5-cm x 25.4-cm) unspliced planks, cleated together on the underside, starting 6 in (15.2 cm) from each end at intervals not to exceed 4 ft (1.2 m).

(2) The plank platform shall not extend beyond the hangers more than 12 in (30.4 cm). A bar or other effective means shall be securely fastened to the platform at each end to prevent its slipping off the hanger.

(3) The span between hangers for plank platforms shall not exceed 8 ft (2.4 m).

d. Beam platforms.

(1) Beam platforms shall have side stringers of lumber not less than 2 in x 6 in (5 cm x 15.2 cm), set on edge.

(2) The span between hangers shall not exceed 12 ft (3.6 m) when beam platforms are used.

(3) The flooring shall be of 1-in x 6-in (2.5-cm x 15.2-cm) material properly nailed. Floor boards shall not be spaced more than 1/2 in (1.2 cm) apart.

(4) The flooring shall be supported on 2-in x 6-in (5-cm x 15.2-cm) cross beams, laid flat and set into the upper edge

EM 385-1-1

3 Nov 03

of the stringers with a snug fit, at intervals of not more than 4 ft (1.2 m), nailed securely in place.

22.E.10 Suspended scaffolds shall be guyed, braced, guided, or equipped with tag line to prevent swaying.

22.E.11 Two-point suspension scaffolds.

a. Two-point suspension scaffold platforms shall not be less than 20 in (50.8 cm) nor more than 36 in (91.4 cm) wide. The platform shall be securely fastened to the hangers by U-bolts or by other equivalent means.

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

c. Two-point suspension scaffolds shall be securely lashed to the structure. Window cleaner's anchors shall not be used.

d. The platform on every two-point suspension scaffolds shall be of the light metal, ladder-, plank-, or beam-type.

e. Two-point suspension scaffolds shall not be joined by bridging.

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

22.E.12 Mason's multiple-point adjustable suspension scaffolds.

a. When employees on the scaffold are exposed to overhead hazards, overhead protection equivalent in strength to 2-in (5-cm) planking shall be provided on the scaffold not more than

9 ft (2.7 m) above the platform, laid tight and extending the entire width of the scaffold.

b. The scaffold shall be capable of sustaining a load of 50 psf (2394 Pa) and shall not be overloaded.

c. The platform shall be suspended by wire ropes from overhead outrigger beams.

22.E.13 Stonesetters' multiple-point adjustable suspension scaffolds.

a. Stonesetters' multiple-point adjustable suspension scaffolds shall be capable of sustaining a load of 25 psf (1197 Pa) and shall not be overloaded.

b. Stonesetters' multiple-point adjustable suspension scaffolds shall not be used for storage of stone or other heavy materials.

c. The scaffold platform shall be securely fastened to the hangers by U-bolts or other equivalent means.

d. Stonesetters' multiple-point adjustable suspension scaffolds shall be suspended from metal outriggers, iron brackets, wire rope slings, or iron hooks.

e. When two or more stonesetters' multiple-point adjustable suspension scaffolds are used on a structure, they shall not be bridged one to the other, but shall be maintained at even height with platforms abutting closely.

22.E.14 Working capacities.

a. On suspension scaffolds designed for a working load of 500 lb (226.8 kg), no more than two employees shall be permitted to work at one time.

EM 385-1-1

3 Nov 03

- b. On suspension scaffolds with a working load of 750 lb (340.2 kg), no more than three people shall be permitted to work at one time.

22.E.15 Fall protection.

- a. Each person supported by a suspended scaffold shall be protected by a body harness system. > **See 21.C.01**
- b. Full-body harnesses shall be attached by lanyard to a lifeline, trolley line, or scaffold structural member. However, when overhead obstructions or additional platform levels are part of a single-point or two-point adjustable suspension scaffold, then lifelines shall not be used.
 - (1) Lifelines, when used, shall be fastened to a fixed safe point of anchorage, shall be independent of the scaffold, and shall be protected from sharp edges and abrasion;
 - (2) Trolley lines, when used, shall be secured to two or more structural members of the scaffold and shall not be attached to the suspension ropes;
 - (3) When lanyards are connected to trolley lines or structural members on a single-point or two-point adjustable suspension scaffold, the scaffold shall be equipped with additional independent support lines and automatic locking devices capable of stopping the fall of the scaffold in the event one or both of the suspension ropes fail. The independent support lines shall be equal in number and strength to the suspension ropes; and
 - (4) Lifelines, independent support lines, and suspension ropes shall not be attached to one another and shall not be attached to or use the same point of anchorage.
- c. To keep the lifeline continuously attached, with a minimum of slack, to a fixed structure, the attachment point of the lifeline shall be changed as the work progresses.

22.F CRANE SUPPORTED WORK PLATFORMS

22.F.01 Crane supported work platforms shall be used only when the erection, use, and dismantling of conventional means of reaching a work site, such as a personnel hoist, ladder, stairway, or scaffold would be more hazardous or is not possible because of structural design or work site conditions. The person responsible for the lift shall perform an AHA and attest to the need for the operation in writing. The responsible person shall sign the AHA and submit it to the GDA for acceptance. Personnel shall not be hoisted until the GDA has accepted the AHA. (Crane supported work platforms may be used for routine access of employees to underground construction via a shaft.)

22.F.02 The work platform and suspension system shall be designed by a registered engineer or a qualified person competent in structural design.

- a. The work platform (excluding fall protection systems) shall be capable of supporting, without failure, its own weight and at least five times the maximum intended load.
- b. The suspension system shall be designed to minimize tipping of the platform due to movement of the employees on the work platform.

22.F.03 Crane supported work platforms shall meet the following requirements:

- a. The scaffold shall be of metal or metal frame construction with a standard railing.
- b. A grab rail shall be installed inside the entire perimeter of the personnel platform.
- c. Access gates, if installed, shall not swing outward during hoisting and shall be equipped with a restraining device to prevent accidentally opening.

EM 385-1-1

3 Nov 03

- d. Headroom shall be provided that will allow employees to stand upright in the platform.²
- e. All welding of the work platform and its components shall be performed by a qualified welder familiar with the weld grades, types, and material specified in the platform design.
- f. The platform shall be conspicuously posted with a plate or other permanent marking that indicates the weight of the platform and its rated load capacity or maximum intended load.

22.F.04 Rigging.

- a. When a wire rope bridle is used to connect the work platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure that the load is evenly distributed among the bridle legs.
- b. The hook connection to the platform rigging shall be of a type that can be closed and locked to eliminate the hook throat opening. Alternately, an alloy anchor type shackle with a bolt, nut, and retaining pin may be used.
- c. Wire rope and rigging hardware shall be capable of supporting, without failure, at least five times the maximum intended load. Where rotation-resistant rope is used the slings shall be capable of supporting without failure at least ten times the maximum intended load.
- d. All eyes in wire rope slings shall be fabricated with thimbles.
- e. Bridles and associated rigging for attaching the platform to the hoist line shall be used only for the platform and the employees and their tools and materials necessary for the work and shall not be used for any other purpose when not hoisting personnel.

22.F.05 Work platform use.

- a. A competent supervisor shall observe the operations while personnel are working from crane supported work platforms.
- b. The number of employees occupying the work platform shall not exceed the number required for the work being performed.
- c. Work platforms shall be used only for employees and their tools and materials necessary for the work. Work platforms shall not be used as material hoists when not hoisting personnel.
- d. Materials and tools for use during a personnel lift shall be secured to prevent displacement and shall be evenly distributed within the platform while it is suspended.

22.F.06 All cranes shall comply with the applicable requirements in Sections 16.

22.F.07 Operational Criteria.

- a. Hoisting of the personnel platform shall be in a slow, controlled, cautious manner with no sudden movements.
- b. Load lines shall be capable of supporting, without failure, at least 7 times the maximum intended load, except where rotation resistant rope is used the lines shall be capable of supporting, without failure, at least 10 times the maximum intended load. The required design factor is achieved by taking the current safety factor of 3.5 and applying the 50% de-rating of the crane capacity.
- c. The crane shall be uniformly level within 1% of level grade and located on firm footing. Cranes equipped with outriggers shall have them all fully deployed to load chart criteria following manufacturer's specifications, as far as practical, when hoisting personnel.

EM 385-1-1

3 Nov 03

d. The total weight of the loaded personnel platform and related rigging shall not exceed 50% of the rated capacity for the radius and configuration of the crane or derrick.

e. Only cranes with power-operated up and down boom hoists and load lines shall be used to support work platforms. The use of machines having live booms is prohibited. Platforms shall be lowered under power and not by the brake.

f. Only cranes with an A2B device that prevents contact between the load block or overhaul ball and the boom tip, or a system that deactivates the hoisting action before damage occurs shall be used.

g. Cranes with variable angle booms shall be equipped with boom angle indicators readily visible to the operator.

h. Cranes with telescoping booms shall be equipped with a device to indicate clearly to the operator, at all times, the boom's extended length, or an accurate determination of the load radius to be used during the lift shall be made prior to hoisting personnel.

i. The load line of the hoist drum shall have a system or device on the power train, other than the load hoist brake, that regulates the lowering rate of speed of the hoist mechanism (controlled lowering): free fall is prohibited.

22.F.08 Proof Testing.

a. Prior to hoisting employees on a crane suspended work platform, and after any repair or modification, the platform and rigging shall be proof tested to 125% of the platform's rated capacity by holding it in a suspended position for 5 minutes with the proof test load evenly distributed on the platform (this may be done concurrently with the trial lift).

b. After proof testing, a competent person shall inspect the platform and rigging.

22.F.09 Trial Meeting, Lift and Inspection.

a. Prior to every trial lift, the crane or derrick operator, signal person, employees to be lifted, and the competent person shall attend a pre-lift meeting to review the applicable parts of this manual, the AHA, and the details of this particular lift.

b. A trial lift with the unoccupied work platform loaded at least to the anticipated lift weight shall be made from the ground level, or any other location where employees will enter the platform, to each location at which the work platform is to be hoisted and positioned.

c. The trial lift shall be made immediately prior to placing personnel on the platform and shall be repeated prior to hoisting employees after the crane is moved and set up at new location or returned to a previously used location, and when the lift route is changed unless the competent person determines that the route change is not significant.

d. The competent person shall determine that all systems, controls, and safety devices are activated and functioning properly; that no interferences exist; and that all configurations necessary to reach those work locations will allow the operator to remain under the 50% limit of the crane's rated capacity.

e. Materials and tools to be used during the actual lift may be loaded in the platform (evenly distributed and secured) for the trial lift.

f. After the trial lift and just prior to hoisting employees, the platform shall be hoisted a few inches and inspected to ensure that it is secure and properly balanced.

EM 385-1-1
3 Nov 03

g. A visual inspection of the crane, derrick, rigging, work platform, and the crane or derrick support base shall be conducted by a competent person immediately after the trial lift to determine whether the testing has exposed any defect or produced any adverse effect upon any component or structure.

h. Any defects found during inspections shall be corrected before hoisting personnel.

i. If the load rope goes slack, the hoisting system shall be re-inspected to ensure that all ropes are properly seated on drums and sheaves.

22.F.10 Work Practices.

a. Before employees enter or exit a hoisted personnel platform that is not landed, the platform shall be secured to the structure, unless securing to the structure creates an unsafe condition.

b. The rated load capacity of the platform shall not be exceeded.

c. The number of employees occupying the work platform shall not exceed the number required for the work being performed.

d. Work platforms shall be used only for employees and their tools and materials necessary for the work; work platforms shall not be used as material hoists when not hoisting personnel.

e. Materials and tools for use during a personnel lift shall be secured to prevent displacement and shall be evenly distributed within the platform while it is suspended.

f. Employees (except a designated signal personal) shall keep

all parts of the body inside the platform during raising, lowering, and positioning.

g. A competent person shall observe the operations while personnel are working from the crane supported work platform.

h. Hoisting of employees shall be discontinued upon indication of any dangerous weather conditions or other impending danger.

i. Employees being hoisted shall remain in the continuous sight of, and in direct contact communication with, the crane operator, competent person, and signal person. In situations where it is not possible, direct communication by radio shall be maintained at all times. The crane operator shall bring all operations to an immediate stop if radio communications are lost.

j. Taglines shall be used to help control the work platform unless the competent person determines that their use would present a greater hazard.

k. The crane or derrick operator shall remain at the controls at all times with the engine crane running whenever the platform is occupied.

22.F.11. Personal Fall Protection

a. Except when working over water, all employees occupying the work platform shall wear a properly anchored personal fall protection system. Depending on the type of work to be done and the height of the work platform above a lower surface, all workers shall wear either a full-body harness fall arrest system or a body-belt fall restraint system. The competent person on-site will assess each situation and determine which system would best fit the current work requirement. Particular attention should be paid to anchor points and capacities.

EM 385-1-1

3 Nov 03

b. When working over water, PFD, lifesaving equipment, and safety skiffs meeting the requirements of this manual shall be used.

22.F.12 Employees shall not be hoisted unless the following conditions are determined to exist:

- a. The load test and proof test requirements are satisfied,
- b. Hoist ropes are free of kinks,
- c. Multiple part lines are not twisted around one another,
- d. The primary attachment is centered over the platform, and
- e. The hoisting system is inspected if the load rope is slack to ensure all ropes are properly seated on drums and in sheaves.

22.F.13 Traveling.

a. Hoisting of personnel while the crane is traveling is prohibited, except for:

- (1) Portal, tower, and locomotive cranes; or
- (2) Where it is demonstrated and documented that there is no less hazardous way to perform the work.

b. If the requirements of 22.F.13a are satisfied, the following safeguards shall be implemented while cranes travel with hoisted personnel:

- (1) Crane travel shall be restricted to a fixed track or runway,
- (2) Travel shall be limited to the load radius of the boom used during the lift,

(3) The boom must be parallel to the direction of travel.

EM 385-1-1
3 Nov 03

(4) A completed trial run shall be performed to test the route of travel before employees are allowed to occupy the platform (this trial run may be performed when the trial lift required by this manual is performed)

22.G FORM AND CARPENTER'S BRACKET SCAFFOLDS

22.G.01 At the minimum, form scaffolds shall be designed in accordance with Table 22-3.

22.G.02 Each bracket, except for wooden bracket form scaffolds, shall be attached to the supporting formwork or structure by means of one or more of the following:

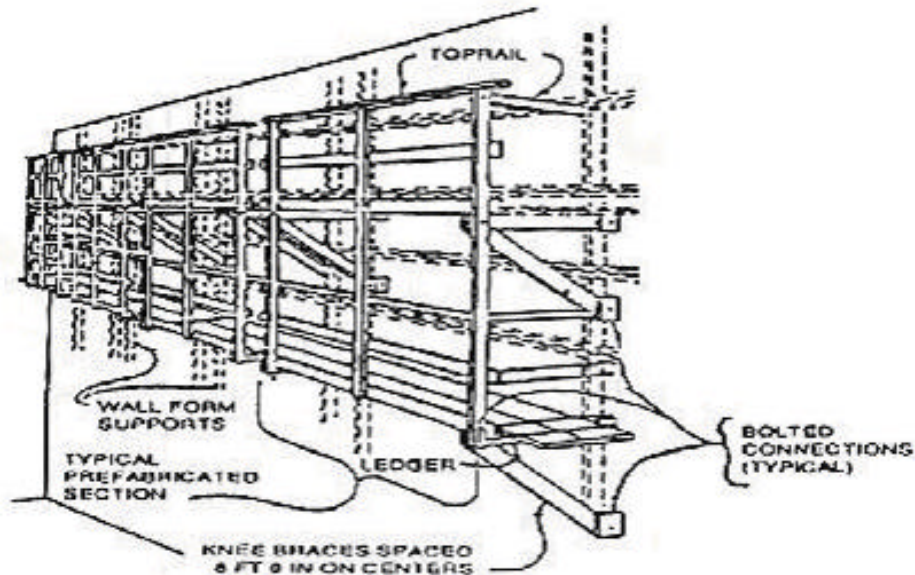
- a. Nails;
- b. A metal stud attachment device ;
- c. Welding;
- d. Hooking over a secured structural supporting member, provided the form walers are bolted to the form or secured by snap ties or tie-bolts extending through the form and securely anchored; or
- e. For carpenter's bracket scaffolds only, by a bolt extending through to the opposite side of the structure's wall.

22.G.03 Wooden form scaffolds shall be an integral part of the form panel.

22.G.04 Folding-type metal brackets, when extended for use, shall be either bolted or secured with a locking-type pin.

22.G.05 Brackets shall consist of a triangular shaped frame made of wood with a cross-section not less than 2-in x 3-in (5-cm x 7.6-cm) or of 1-1/4-in x 1-1/4-in x 1/8-in (3.1-cm x 3.1-cm x 0.3-cm) structural angle iron.

TABLE 22-3
FORM SCAFFOLDS

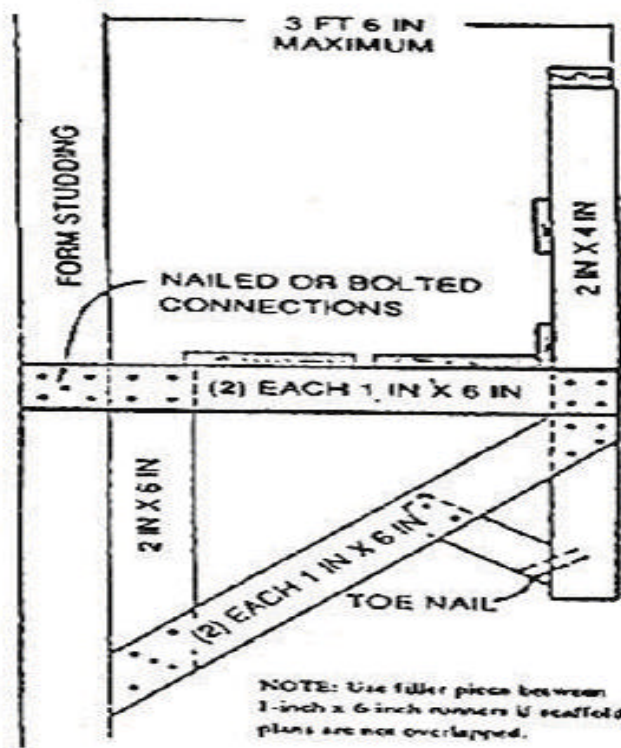


Minimum design criteria for light-duty wooden bracket form scaffolds

Members	Dimensions
Bracket uprights	2 x 4 in or 2 x 6 in (5 x 10.1 cm or 5 x 15.2 cm)
Bracket support ledgers	2 x 6 in (5 x 15.2 cm)
Maximum bracket width	3 ft 6 in (1 m)
Bracket braces	1 x 6 in (2.5 x 15.2 cm)
Guardrail post	2 x 4 in (5 x 10.1 cm)
Guardrail height	36 to 42 in (91.4 to 106.6 cm)
Midrail	1 x 6 in (2.5 x 15.2 cm)
Toeboards	1 x 6 in (2.5 x 15.2 cm)
Bracket upright spacing	8 ft (2.4 m) (on centers)

TABLE 22-3 (CONTINUED)

FORM SCAFFOLDS

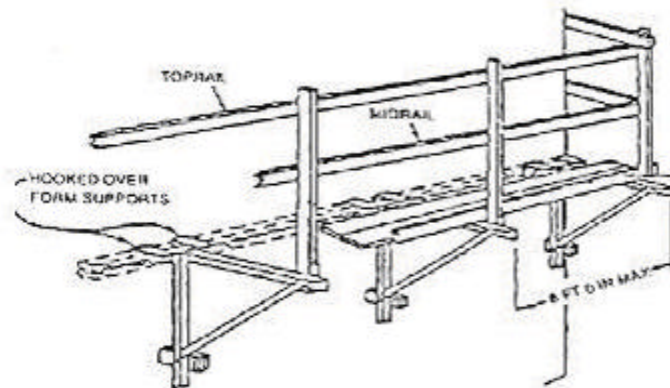


Minimum design criteria for light-duty figure-four form scaffolds

Members	Dimensions
Bracket uprights	2 x 4 in or 2 x 6 in (5 x 10.1 cm or 5 x 15.2 cm)
Bracket outrigger ledgers (2)	1 x 6 in (2.5 x 15.2 cm)
Bracket braces (2)	1 x 6 in (2.5 x 15.2 cm)
Maximum length of ledgers	3 ft 6 in (1 m) (unsupported)
Bracket upright spacing	8 ft (2.4 m) (on centers)

TABLE 22-3 (CONTINUED)

FORM SCAFFOLDS



Minimum design criteria for light-duty metal bracket form scaffolds

Members	Dimensions
Guardrail post	2 x 4 in (5 x 10.1 cm)
Guardrail	2 x 4 in (5 x 10.1 cm)
Guardrail height	36 to 45 in (91.4 to 114.3 cm)
Midrail	1 x 6 in (2.5 x 15.2 cm)
Toeboards	1 x 6 in (2.5 x 15.2 cm)
Metal bracket spacing (metal bracket or scaffold jack dimensions in accordance with manufacturer's design)	8 ft (2.4 m)

EM 385-1-1
3 Nov 03

22.G.06 Bolts used to attach brackets to structures shall not be less than 5/8 in (1.5 cm) in diameter.

22.G.07 Maximum bracket spacing shall be 8 ft (2.4 m) on centers.

22.G.08 Figure-four form scaffolds shall have bearers consisting of two pieces of 1-in x 6-in (2.5-cm x 15.2-cm) lumber nailed on opposite sides of the vertical support; bearers shall project not more than 3.5 ft (1 m) from the outside of the form support and shall be braced and secured to prevent tipping or turning.

22.G.09 The knee or angle brace for figure four form scaffolds shall intersect the bearer at least 3 ft (0.9 m) from the form at an angle of 45° and the lower end shall be nailed to a vertical support.

22.H HORSE SCAFFOLDS

22.H.01 Horse scaffolds shall not be constructed or arranged more than two tiers or 10 ft (3 m) in height: scaffolds shall be 5° feet or less in height and 5 ft (1.5 m) or more in width.

22.H.02 The members of horse scaffolds shall not be less than those specified in Table 22-4.

TABLE 22-4

MINIMUM DIMENSIONS FOR HORSE SCAFFOLD MEMBERS

Members	Dimensions
Horizontal members of bearers	3 x 3.9 in (7.6 x 10 cm)
Legs	2 x 3.9 in (5 x 10 cm)
Longitudinal brace between legs	1 x 5.9 in (2.5 x 15 cm)
Gusset brace at top of legs	1 x 7.9 in (2.5 x 20 cm)
Half diagonal braces	2 x 3.9 in (5 x 10 cm)

22.H.03 Horse scaffolds shall be spaced not more than 5 ft (1.5 m) for medium duty and not more than 8 ft (2.4 m) for light duty.

22.H.04 When arranged in tiers, each horse scaffold shall be placed directly over the horse scaffold in the tier below. The legs shall be nailed or otherwise secured to the planks to prevent displacement or thrust and each tier shall be cross braced.

22.I PUMP JACK SCAFFOLDS

22.I.01 Pump jack scaffolds shall not carry a working load exceeding 500 lb (226.8 kg). The components shall not be loaded in excess of the manufacturer's recommended limits.

22.I.02 Pump jack brackets, braces, and accessories shall be fabricated from metal plates and angles and installed in accordance with the manufacturer's recommendations. Installation and operational manuals shall be available upon request of the GDA.

22.I.03 Poles.

- a. Pole lumber shall be two 2-in x 4-in (5-cm x 10.1-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. Poles shall not exceed 30 ft (9.1 m) in height.
- c. When poles are constructed of two continuous lengths they shall be of 2-in x 4-in (5-cm x 10.1-cm) stock, spiked together with the seam parallel to the bracket, and with 10d nails, no more than 12 in (30.4 cm) center-to-center, staggered uniformly from opposite outside edges.
- d. If 2-in x 4-in (5-cm x 10.1-cm) stock is spliced to make up the pole, the splices shall be so constructed as to develop the full strength of the member.

EM 385-1-1

3 Nov 03

e. Poles shall be secured 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 ft (3 m) between braces. Each brace shall be capable of supporting a minimum of 225-lb (102-kg) tension or compression.

f. When wood scaffold planks are used as platforms, poles used for pump jacks shall not be spaced more than 10 ft (3 m) on center. When fabricated platforms are used that comply with all other provisions of this Section, pole spacing may exceed 10 ft (3 m) on center if permitted by the manufacturer.

22.1.04 Brackets.

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

b. Platform brackets shall be fully decked and the planking secured.

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

22.1.05 Not more than two persons shall be permitted at one time upon a pump jack scaffold between any two supports.

22.1.06 When a work bench is used at an approximate height of 42 in (106.6 cm), the top guardrail may be eliminated if the work bench is fully decked, the planking secured, and is capable of withstanding 200 lb (90.7 kg) pressure in any direction. Employees shall not be permitted to use a workbench as a scaffold platform.

22.1.07 A ladder shall provide access to the platform during use.

22.J ELEVATING WORK PLATFORMS

22.J.01 Elevating work platforms shall be designed and constructed in accordance with ANSI/Scaffold Industry Association (SIA) A92.3, ANSI/SIA A92.5, and ANSI/SIA A92.6, as appropriate.

22.J.02 Elevating work platforms shall be operated, inspected, and maintained as specified in the operating manual for the equipment.

- a. Elevating work platforms shall also comply with requirements of this Section and 16.A.
- b. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

22.J.03 All boom-supported elevating work platforms shall be equipped with an alarm, or other suitable warning device, at the platform. The alarm shall be in operable condition and shall automatically activate when the machine base is more than 5° out of level in any direction.

22.J.04 Only personnel trained in the use of the elevating work platform shall be authorized to operate it. Training shall consist of:

- a. Reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents, and
- b. Reading and understanding all decals, warnings, and instructions on the elevating work platform.

22.J.05 Before operating the work platform the operator shall:

- a. 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;

EM 385-1-1

3 Nov 03

- b. Ensure the elevating work platform is on a firm, level surface;
- c. Ensure the work platform is loaded in accordance with the manufacturer's specifications;
- d. Ensure that outriggers and/or stabilizers are used if required by the manufacturer;
- e. Ensure that, if the vehicle is on wheels, the wheels are locked or chocked; and
- f. Ensure that fall protection systems are in place.

22.J.06 Elevating work platforms shall not be used by persons working on energized electrical wiring and/or equipment.

22.J.07 The use of personal fall protection devices shall be as specified in the manufacturer's operating manual. Personal fall protection devices, if used, may only be secured to manufacturer-approved hard points.

22.K VEHICLE-MOUNTED ELEVATING AND ROTATING WORK PLATFORMS

22.K.01 Vehicle-mounted elevating and rotating work platforms shall be designed and constructed in accordance with ANSI/SIA A92.2.

22.K.02 Vehicle-mounted elevating and rotating work platforms shall be operated, inspected, tested, and maintained as specified in the operating manual for that piece of equipment.

- a. Vehicle-mounted elevating and rotating work platforms shall also comply with requirements of this Section and 16.A.
- b. Records of inspections conducted while the unit is at the work site shall be maintained at the work site.

c. If the unit is considered, rated, and used as an insulating device, copies of the electrical insulating components and system tests conducted while the unit is at the work site shall be maintained at the work site.

22.K.03 Only personnel trained in the use of the vehicle-mounted elevating and rotating work platform shall be authorized to operate it. Training shall consist of:

- a. Reading and understanding the manufacturer's operating manual and any associated rules and instructions, or training by a qualified person on the contents on these documents; and
- b. Reading and understanding all decals, warnings, and instructions on the vehicle-mounted elevating and rotating work platform.

22.K.04 Transporting.

- a. An aerial lift truck shall not be moved 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.
- b. Before moving an aerial lift, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed positions, except as provided in a, above.
- c. Aerial ladders shall be secured 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.

22.K.05 Operating practices.

- a. When outriggers are used, they shall be positioned on pads or a solid surface and the brakes shall be set.

EM 385-1-1

3 Nov 03

- b. Wheel chocks shall be in place before using an aerial lift.

22.K.06 Fall protection.

- a. Belting off to an adjacent pole structure or equipment while working from an aerial lift shall not be permitted.
- b. Employees shall always stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- c. A harness and lanyard, or deceleration device of length or design with a suitable height anchorage such that any fall over the platform edge shall not cause impact with the ground, shall be worn by a worker when working from the basket of a vehicle mounted aerial lift.

22.L Mast Climbing Work Platform

22.L.01 An inspection will be performed prior to erecting the work platform.

- a. An overhead inspection will be done to ensure that the work platform will not come in contact with any obstructions while moving up or down the mast. Special attention will be given to high voltage conductors.
- b. An inspection of the ground will be done to ensure that there are no obstacles around the work platform and in the path of travel such as holes, drop-offs, debris, ditches, or soft fill.
- c. Daily maintenance and inspections will be performed and documented. Copies will be maintained on the job site.

22.L.02 Only a designated operator will use the platform.

22.L.03 The platform will not be raised on uneven or sloped surfaces unless outriggers are used to level the platform and the ground is suitable to support the load.

22.L.04 Platforms will not be raised without outriggers extended and locked in proper operating position. The unit will be leveled before raising the platform. **NOTE: Not all Mast Climbing Work Platforms are designed with freestanding capability. Check the machine and manual to see if the machine being operated has a freestanding height.**

22.L.05 The platform must be lowered when moved, and must be set up and leveled each time before it is elevated.

22.L.06 A mast climbing work platform, with platform elevated or personnel on the platform, will not be driven. The manufacturer's instructions will be referred to when moving a mast climbing work platform to determine the safe mast height for ground conditions, ground slope, and overhead obstructions.

22.L.07 Mast climbing work platforms will be properly tied to the building (or structure) within the manufacturer's recommended guidelines unless it is designed to be freestanding.

22.L.08 Mast climbing work platforms will not be moved unless everyone on the platform is aware of the direction the platform is being moved.

22.L.09 No ladders or structures of any kind will be used to increase the size or working height of platform.

22.L.10 Climbing of braces and guardrails is prohibited.

22.L.11 The work platform will not be raised in windy or gusty conditions. The operation manual will be followed to determine maximum in-service wind speed conditions. A copy of the operation manual will be available on the job site.

EM 385-1-1

3 Nov 03

22.L.12 Platforms will not be altered or modified in any way. Changing the configuration may change load capacity, freestanding height, and tie frequency. Mechanical, hydraulic, or electrical changes may adversely affect operation of this machine.

22.L.13 A competent person will perform daily maintenance and inspections.

22.L.14 Training. Personnel will be trained before using and/or operating mast climbing work platforms. Each user and operator will:

- a. Read and understand all cautions and danger warnings on the machine and in the operator's manual
- b. Have a solid working understanding of the controls.
- c. Understand the hazards associated with the use of mast climbing work platforms.
- d. Ensure that only authorized personnel use the platform.

22.L.15 A damaged or malfunctioning machine will not be used. Operation of damaged equipment shall be discontinued until the unit is repaired.