

SAFETY CODE No. 9

Demolition, Building and Construction

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Authority: Act 161 of 1937

STATE BUILDING AND CONSTRUCTION SAFETY CODE

Promulgated by the Commissioner of Labor pursuant to the provisions of Act 161 of 1937.

Effective January 22, 1965

A. Purpose

- A (1) The intent and purpose of this code is to provide and establish minimum standards flexible enough to cover all phases of construction, yet be sufficiently rigid to afford the maximum protection for the health and safety of all engaged in the industry. It is intended that this code shall be interpreted and administered with sound judgment commensurate with acceptable good safety practices.
- B (2) The authority for the adoption, administration, and enforcement of this code will be found in Act 161 of 1937 as amended by Act 126 of 1943.
- B (2) This code or rule shall be administered and enforced by the Commissioner of Labor and his duly authorized representatives.

C. Definitions and Interpretations

- C (1) The words "shall" and "will" shall be deemed mandatory.

- C (2) The words "should" and "may" shall be deemed advisable.
- C (3) This code shall apply to all persons, firms or corporations engaged in the general construction industry.
- C (4) The term "general construction industry" shall be deemed to include all phases of construction of buildings, highways, bridges, tunnels, sewers, excavations, erection, demolition, dismantling, wrecking, building repair or alteration, and all such other work coming within the jurisdiction and normally done by the construction industry.

D. Reference to Other Codes and Publications

Construction involves so many different types of operations that to include all applicable code material would result in much needless duplication. Where subjects covered by other recognized codes are common to the usual construction jobs, necessary material from such codes has been included, as in the case of ladders, temporary floors, stairs, railings, and toe boards.

This code is therefore, supplemented by other codes and safety publications as herein states:

American Standard Safety Code for Building Construction

E.I. DuPont De Nemours and Company, Inc.

Ramsett Tool Company, Cleveland, Ohio

Interstate Commerce Commission Revised Safety Regulations

American Standard Safety Code for Portable Wood Ladders

American Standard Safety Code for Portable Wood Ladders, in addition the following listed State Safety Codes shall apply where applicable as shall the regulations of the State Board of Health.

Arkansas Department of Labor "Basic Safety Manual."

Arkansas Department of Labor "Safety Code for Mechanical Power-Transmission Apparatus" (Code No. 1)

Arkansas Department of Labor "Safety Code for Woodworking Plants" (Code No. 2.)

Arkansas Department of Labor "Safety Code for Industrial Sanitation in Manufacturing Establishments" (Code No. 6)

And the rules and regulations of the State Board of Health of Arkansas.

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PART 1

DEMOLITION

SECTION 1 - GENERAL

1.1 This part on "Demolition" is intended to be complete in itself, but any device or equipment such as scaffolds, ladders, derricks, hoists, etc., used in connection with the demolition work shall be constructed, installed, inspected, maintained, and operated in accordance with the regulations governing the construction, installation, inspection, maintenance, and operation of such device or equipment as specified in other parts of this code.

1.2 Where applicable, federal, state, and local codes, rules, regulations, and ordinances governing any and all phases of demolition work shall be observed at all times.

1.3 No structure, or part of a structure, or any floor or temporary support, or scaffold, sidewalk shed, or bridge, or any device or equipment shall be loaded in excess of the safe carrying capacity which shall never be considered more than one-third (1/3) of its ultimate structural strength.

1.4 Walkways and passageways shall be provided for the use of the workmen, who shall be instructed to use them, and all such walkways and passageways shall be kept adequately lighted and free from debris and other materials.

1.5 All men on any demolition job shall be furnished with and required to wear approved type hardhats.

1.6 WARNING SIGNS AND LIGHTS

1.6.1 On every demolition job, danger signs shall be conspicuously posted around the property, and all doorways or thoroughfares giving access to the property shall be kept barricaded except during the actual passage of men or equipment.

1.6.2 During the hours of darkness, red lights or flares shall be placed on or about all barricades.

1.6.3 The contractor shall maintain all danger signs, lights and barricades at all times, and when necessary, shall provide a watchman to keep public from entering the danger zone.

1.7 Workers using jack hammers shall be furnished with approved type goggles or safety eye-glasses and, if the operations are dusty, with respirators approved by the U.S. Bureau of Mines for Type A dust; and the workers shall be required to wear such protective devices.

1.8 For information concerning the use of jacks, see Part 2, Section 4.

1.9 Lumber sizes, when used in this Part, refer to nominal stock sizes.

SECTION 2 - PREPARATORY

2.1 If a structure to be demolished has been partially wrecked by fire, flood, explosion, or other causes, the walls shall be shored or braced in accordance with the requirements of the authorities having jurisdiction, or in the absence of such requirements, in accordance with accepted engineering practices, before any demolition work is started.

2.2 DISCONNECTING UTILITY SERVICE

2.2.1 The power on all electric service lines shall be shut off and all such lines cut or disconnected at or outside the property line before demolition work is started. Prior to the cutting of such lines, the contractor or property owner shall notify and obtain the approval or cooperation of the electric service company.

2.2.2 All gas, water, steam, and other service lines shall be shut off and capped or otherwise controlled at or outside the building line or curb before demolition work is started. In each case, the service company involved shall be notified in advance and its approval or cooperation obtained by the contractor or property owner.

2.3 If it is necessary to maintain any power, water, or other lines during demolition, such lines shall be temporarily relocated or protected with substantial covering to the satisfaction of the utility company and in accordance with applicable codes and legal requirements.

2.4 Glazed sash and glazed doors and other glass shall be removed before other demolition work is started.

2.5 All exterior wall openings which extend down to the floor level shall be barricaded to a height not less than three (3) feet above floor level. This provision shall not apply to a story after structural demolition of that story has been started, nor to the ground level floor.

2.6 All floor openings and shafts not used for material chutes shall be floored over or enclosed with guardrails and toe boards.

2.7 Except for the cutting of holes in floors for chutes, and holes through which to drop materials, preparation of storage space, and other necessary preparatory work, demolition of exterior walls and floor construction shall begin at the top of the structure and proceed downward, and each story of exterior wall and floor construction shall be removed and dropped into the storage space before commencing the removal of walls and floors in the story next below. This requirement shall not prohibit the demolition of a structure in sections if positive means are taken to prevent injury to persons or damage to property.

SECTION 3 - PUBLIC AND OTHER GROUND LEVEL PROTECTION

3.1 Before any demolition work is commenced, every sidewalk or public thoroughfare adjacent to the work site shall either be closed or protected as

specified elsewhere in this section. All such thoroughfares which are open to the public shall be kept clear and unobstructed at all times. (Also see Rule 1.6, Sec. 1.)

3.2 If the structure to be demolished is more than two (2) stories of twenty-five (25) feet high measured from sidewalk or street level and the horizontal distance from the inside of the sidewalk to the structure is fifteen (15) feet or less, a substantial sidewalk shed shall be constructed over the entire length of the sidewalk adjacent to the structure, of sufficient width to accommodate pedestrian traffic without causing congestion. The sidewalk shed shall be lighted either by natural or artificial means sufficient to ensure safety at all times.

3.3 Every sidewalk shed shall be capable of safely sustaining a load of one hundred and fifty (150) pounds per square foot, and if material is to be stored thereon it shall be capable of sustaining a load of at least three hundred (300) pounds per square foot.

3.4 The outside edge and ends of the deck of the shed shall be provided with a substantial enclosure of at least forty-two (42) inches above the deck of the shed. Such enclosures may be vertical or inclined outward at approximately forty-five (45) degrees and shall consist of boards laid close together secured to braced uprights, or toe boards and galvanized wire netting formed of not less than No. 16 U.S. gage wire and one and one-half (1 1/2) inch mesh or of corrugated metal or plywood.

3.5 Sidewalk shed openings for loading purposes shall be kept closed at all times except during actual loading operations.

3.6 The deck flooring of a sidewalk shed shall consist of planking not less than two (2) inches in thickness, closely laid, and the deck made water-tight. All members of the shed shall be adequately braced and connected to resist displacement of members or distortion of the framework.

3.7 Unless the top deck of the sidewalk shed is built solidly against the face of the structure to be demolished, the vertical face of the shed supports next to the building shall be solidly fenced throughout. This shall not prohibit the construction and use of solid sliding or swinging gates as may be necessary for the protection of the work.

3.8 When the horizontal distance from the inside of the sidewalk to the structure is more than fifteen (15) feet and less than twenty-five (25) feet, a sidewalk shed may be constructed over the sidewalk as described above or, in place of a shed, a substantial fence shall be constructed along the inside edge of the sidewalk or, if permission has been granted to close the sidewalk, along the inside edge of the roadway.

3.9 Every fence shall be constructed at least six (6) feet high of wood or other suitable material and shall be built solid for its entire height and length except that openings necessary for the proper prosecution of the work may be provided with solid sliding or swinging gates.

3.10 When the horizontal distance from the inside of the sidewalk to the structure is more than twenty-five (25) feet, a shed or fence as described above may be built or, in place of such shed or fence, a substantial railing shall be constructed on the inside of the sidewalk or

roadway along the entire length of the demolition site and provided with movable bars as may be necessary for the proper prosecution of the work.

3 .11 Where workers' entrances to buildings being demolished are not completely protected by sidewalk sheds, all such entrances shall be protected by canopies extending from the face of the building to a point not less than eight (8) feet from it. In each case such overhead protection shall be at least two (2) feet wider than the building entrance or opening and every canopy shall be at least as strong as the sidewalk shed specified in rule 3.6 above .

SECTION 4 - REMOVAL OF MATERIALS

A. Through Chutes

4.1 No material shall be dropped (by gravity) to any point lying outside the exterior walls of the building except through enclosed wooden or metal chutes.

4.2 All material chutes which are at an angle of more than forty-five (45) degrees from the horizontal shall be entirely enclosed on all four (4) sides except for openings at or about floor level for the receiving of materials.

4.3 Openings as specified in rule 4.2 shall not exceed forty-eight (48) inches in height measured along the wall of the chute, and in all stories below the top floor such openings shall be kept closed when not in use.

4.4 Chutes at an angle of less than forty-five (45) degrees with the horizontal may be left open on the upper side, provided that at the point where such a chute discharges into a chute steeper than forty-five (45) degrees with the horizontal the top of the steeper chute shall be boarded over to prevent the escape of material.

4.5 A strong gate shall be installed in each chute at or near the discharge end and a reliable employee shall be designated to control the gate and the backing up and loading of trucks.

4.6 The designated employee shall be instructed to prevent any person from standing or passing under the discharge end of the chute.

4.7 When operations are not in progress, the danger area at the discharge end of each chute shall be completely enclosed with a substantial fence or otherwise made inaccessible.

4.8 Any opening into which workmen dump debris at the top of a chute shall be guarded by a substantial guardrail extending at least thirty-six (36) inches above the level of the floor or other surface on which men stand to dump material into chutes.

4.9 A toe board or bumper not less than two (2) inches thick and six (6) inches high (nominal size) shall be provided at each chute opening if the material is dumped from wheelbarrows. Any space between the chute and edge of openings in the floors through which it passes shall be solidly planked over.

B. Through Holes in the Floor

4.10 If debris is dropped through holes in the floor without the use of chutes, the total area of the hole cut in any intermediate floor, one which lies between the floor that is being demolished and the storage floor, shall not exceed twenty-five (25) percent of such floor area.

4.11 The total area of a floor shall be computed from measurements taken to the inside face of the exterior walls, and the area of floor openings which existed before the beginning of the demolition of the structure shall not be deducted in computing the total area.

4.12 If the structure is demolished in sections, the total area of the holes cut in any section of the floor shall not exceed twenty-five (25) percent of such sectional floor area.

4.13 Openings in all floors below the floor from which walls, partitions, or floor construction is being removed shall be protected by standard railings and toe boards or preferably planked over if the holes are not being used for dumping material.

4.14 All intermediate floor openings for the passage of material shall be completely enclosed with barricades or substantial guardrails not less than thirty-six (36) inches high and at a distance of not less than six (6) feet from the edge of any opening. No barricade or guardrail shall be removed until the story immediately above has been demolished down to the floor line and all debris cleared from that floor.

4.15 When the cutting of a hole in an intermediate floor between the storage floor and the floor which is being demolished makes the intermediate floor or any portion of it unsafe, then such intermediate floor shall be properly shored.

SECTION 5 - STAIRS, PASSAGEWAYS, AND LADDERS

5.1 With the exception of stairways, passageways, and ladders for the use of workmen, access to the building being demolished shall be entirely closed off at all times.

5.2 All ladders shall meet the material and construction requirements specified in Part 10, "Ladders" of this code.

5.3 All stairs, passageways, and ladders covered in Rule 5.1 above shall be maintained in a safe condition.

5.4 Ladders or their side rails shall extend not less than forty-two (42) inches above the floor or platform to which such ladders give access.

5.5 All ladders shall be secured against slipping out at the bottom and against movement in any direction at the top.

SECTION 6 - REMOVAL OF WALLS

6.1 Masonry walls or other sections of masonry shall not be permitted to fall upon the floors of the building in such masses as to exceed the safe carrying capacity of the floors.

6.2 No section of wall whose height is more than twenty-two (22) times its thickness shall be permitted to stand without lateral bracing unless such wall is in good condition and was originally designed to stand to a greater height without such lateral support.

6.3 No employer shall suffer or permit any employee to work on top of a wall.

6.4 Structural or load-supporting members on any floor shall not be cut or removed until all stories above that floor have been demolished and removed. This provision shall not prohibit the cutting of floor beams for the purpose stated in Part 1, Section 4, of this code or for the installation of equipment or as specified in rule 9.7, Part 1, of this code.

6.5 Before demolishing any interior or exterior wall which is within ten (10) feet of any opening in the floor immediately below, such opening shall be substantially planked over unless all workmen are removed from all floors below and access to such floors is positively prevented.

6.6 In building of "skeleton" construction, the steel framing may be left in place during the demolition of masonry work. Where this is done, all steel beams, girders and the like, shall be cleared of all loose material as the masonry work progresses downward.

6.7 Walkways shall be provided to enable workmen to reach or leave their work on any scaffold or wall. Such walkways shall be not less than three (3) planks nor less than thirty (30) inches wide.

6.8 At the completion of each day's work, all walls shall be left stable and in no danger of being overturned.

6.9 Foundation walls which serve as retaining walls to support earth or adjoining structures shall not be demolished until such adjoining structures have been underpinned or braced, and earth removed or supported by sheet piling or sheeting.

6.10 In the demolition of brick and masonry chimneys which cannot safely be toppled or dropped, all materials shall be dropped down on the inside of such chimneys.

6.11 The loading point at the discharge end of any chute at or near the bottom of a chimney shall be completely protected by means of an overhead timber canopy having a strength equal to the sidewalk shed specified in Rule 3.6, Part 1 of this code.

6.12 Construction sheds and tool boxes shall be so located as to protect workers from the danger of falling walls and other falling objects.

SECTION 7 - CATCH PLATFORMS

7.1 During the demolition of the exterior walls of a structure originally more than seventy (70) feet high, catch platforms shall be erected

along the exterior faces of such walls where necessary to prevent injury to the public and men working below.

7.2 Such catch platforms shall be constructed and maintained not more than three (3) stories below the story from which the exterior walls are being removed. When the demolition has progressed to within three (3) stories of ground level, catch platforms will not be considered necessary.

7.3 Catch platforms shall be not less than five (5) feet in width measured in a horizontal direction from the face of the structure and shall consist of out-riggers and planks. Planks shall be laid tight together and without openings between them and the wall.

7.4 Catch platforms may be constructed of material other than wood provided such material is of equal strength and does not otherwise lessen the security against falling material.

7.5 The catch platforms shall be inclined so that the outer edge is at least six (6) inches higher than the inner edge.

7.6 Catch platforms shall be capable of sustaining a live load of not less than one hundred and twenty-five (125) pounds per square foot.

7.7 Supports shall consist of outriggers of ample strength, secured against turning and spaced not more than ten (10) feet apart.

7.8 Each outrigger shall have ample support against the building or in window opening and shall be adequately secured. Planks supported by the outrigger shall be not less than two (2) inches thick and the ends shall overlap each other for a distance of at least one (1) foot over the supports. All planks shall be secured against displacement.

7.9 The outer edge of each catch platform shall be provided with a substantial enclosure constructed at an angle of approximately forty-five (45) degrees with the horizontal and having its outer edge not less than forty-eight (48) inches from the platform measured along the slope of the enclosure.

7.10 The enclosure shall consist of galvanized wire mesh made of not less than No. 16 U.S. Gage wire and one and one-half (1 1/2) inch mesh. The enclosure shall be secured to supports placed not more than ten (10) feet apart.

7.11 There shall be no openings between the platform and the enclosure.

7.12 Supports for the enclosure shall be not less than two (2) inches by six (6) inches in section with the greater dimension at right angles to the enclosures.

7.13 Materials shall not be dumped on catch platforms nor shall such platforms be used for the storage of material.

SECTION 8 - REMOVAL OF FLOORS

8.1 In the following rules the term "floor arches" shall apply to the masonry filling between the floor beams and girders irrespective of the type of floor system.

8.2 In cutting holes in floor arches which span in one direction between two (2) beams or supports, the section of floor arch to be removed in making such hole may be of any width and shall include the entire span of the floor arch which is between the two (2) beams or supports on which it bears.

8.3 When workmen are engaged in removing floors, planks of ample strength (not less than two (2) inches thick by ten (10) inches wide) shall be provided and used by workmen breaking down floor arches. The planks shall be so placed as to give the workmen firm support should the arch collapse unexpectedly and, if it is necessary for a workman to straddle a space between two planks, such space shall not exceed sixteen (16) inches.

8.4 Walkways not less than thirty (30) inches wide formed of planks of ample strength (not less than two (2) inches thick by ten (10) inches wide) shall be provided and used by the workmen when necessary to enable them to reach any work place without walking on exposed beams.

8.5 Stringers of ample strength shall be installed to support planks where necessary and the ends of such stringers shall be supported by floor beams or girders and not by floor arches alone.

8.6 When floor arches are being removed, no workmen shall be allowed to work in the area directly underneath and such area shall be barricaded to prevent access to it.

8.7 The demolition of floor arches shall not be started until they and the surrounding floor area for a distance of twenty (20) feet have been entirely cleared of debris and other unnecessary material.

8.8 Planks used for temporary protection shall be sound and at least two (2) inches thick. They shall be laid close together with the ends overlapping at least four (4) inches over solid bearings to prevent tipping under a load.

SECTION 9 - STORAGE SPACE

9.1 The storage of waste material or debris on any floor of the building or structure to be demolished shall not be permitted to such an extent that the original allowable floor load is exceeded.

9.2 In buildings having wooden floor construction, the flooring boards may be removed from not more than one (1) floor above the curb to provide storage space for debris provided falling material is not permitted to endanger the stability of the structure.

9.3 If wood floor beams are required to brace the interior walls or free standing exterior walls, such beams shall be left in place until some other approved support can be substituted.

9.4. In buildings of fireproof construction, floor arches to an elevation of not more than twenty-five (25) feet above the curb may be

removed to provide storage for debris provided such removal does not endanger the stability of the structure.

9.5 If the floor arches are removed from more than one floor for this purpose, the removal shall start at the highest floor, but not over twenty-five (25) feet above the curb, and shall proceed downward subject to all requirements applying to the removal of floor arches.

9.6 As an alternative method, the removal of floor arches from the storage space may start at the lowest floor and proceed upward provided that the removal of any floor arch above the lowest is delayed until the top surface of the debris in the storage space is not more than one story below the floor arch to be removed.

9.7 Intermediate steel floor beams which are not required for the stability of the structure may be removed from the storage space defined in Rule 9.4.

9.8 The dumping of material from upper floors into the storage space shall be entirely discontinued during all periods when men are engaged in removing floor arches, floor beams, or performing any other work in the storage space.

9.9 Walls shall not be subjected to lateral pressure from stored material or lateral impact from falling material.

9.10 The storage space into which material is dumped shall be blocked off, except for openings necessary for the removal of material and such openings shall be closed at all times when material is not being removed.

SECTION 10 - DEMOLITION OF STEEL CONSTRUCTION

10.1 When floor arches have been removed, the entire tier of beams on which any derrick is supported shall be completely planked over except for such openings as are required for handling material or equipment.

10.2 In the operation of cranes and derricks, a standard signal system shall be used and all men assigned to the operation of such equipment shall be fully instructed on the signals.

10.3 A tag-line or guide rope shall be used on all hoisted or lowered loads.

10.4 The riding of the load line in any lifting device shall be strictly prohibited.

10.5 Whenever acetylene or oxygen cylinders are transported or lifted by crane or derrick, such cylinders shall be placed in substantial stands or cradles.

10.6 No beam shall be cut until precautions have been taken to prevent it from swinging freely and possibly striking any worker or any piece of equipment or any part of the structure being demolished.

10.7 All structural steel shall be lowered from the building and never allowed to drop.

10.8 When a structural steel frame is demolished without a derrick, the entire tier of beams next below that from which the beams and columns are being removed shall be completely planked over. This provision shall not apply to floors from which arches have not been removed nor to openings for the passage of material or equipment.

PART 2

EXCAVATION WORK

SECTION 0 - DEFINITIONS

0.1 EQUIPMENT. "Equipment" shall mean ladders, scaffolds, ramps, runways, railings, barricades, sheet piling, shoring, bracing, and any such safeguards, protective construction, and devices used in affording protection to the men engaged in excavating work.

0.2 JACK. A "jack" shall mean a mechanical or hydraulic device to lift, lower, or remove a load by manpower applied through leverage.

0.3 RAMP. A "ramp" shall mean any inclined runway including those constructed entirely of dirt.

0.4 RUNWAY. A "runway" shall mean any planked over walkway or drive constructed and maintained as a passageway for workmen or rolling equipment. (Rule 5.6 in Part 2.)

0.5 SHAFT. A "shaft" shall mean a hole sunk into the ground at an angle of forty-five (45) degrees or less with the vertical.

0.6 TRENCH. A "trench" shall mean a narrow excavation made below the surface of the ground. In general the depth will be greater than one of the horizontal dimensions.

0.7 C TO C. "C to c shall mean center to center.

SECTION 1 - GENERAL

1.1 This part on "Excavation Work" provides for the protection of the public, employees, and property during all excavation work in connection with building and trenching operations, including related subsurface or below grade-level work such as the underpinning, shoring, and bracing of foundations, retaining walls, and the like.

1.2 All employees working in excavations or trenches more than six (6) feet in depth shall be provided with and required to wear approved type hardhats.

1.3 Any device or equipment used in connection with excavation work shall be constructed, installed, inspected, maintained, and operated by the owner or user as specified in applicable parts of this code.

1.4 Where applicable, federal, state, or local codes, rules, regulations, and ordinances governing any and all phases of excavation work shall be observed at all times.

1.5 Trees, boulders, and other surface encumbrances located so as to create a hazard at any time during operations shall be removed before excavating is started.

1.6 If the stability of adjoining buildings or walls is endangered by excavations, shoring, bracing, or underpinning shall be provided as necessary to ensure their safety. Such shoring, bracing, or underpinning shall be frequently inspected by a competent person and the protection effectively maintained.

1.7 Excavations shall be inspected after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins increased if necessary.

1.8 If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above and near an excavation, the side of the excavation shall be sheet-piled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

1.9 The sides of every excavation four (4) feet or more in depth, where there is danger of slides or cave-ins shall be supported by substantially braced sheet piling or shoring unless the sides of the excavation are sloped to the angle of repose of the material being excavated.

1.10 Whenever any part of an excavation is protected by a masonry wall, such wall shall be braced to ensure stability. This shall not include reinforced concrete walls known to be of ample strength.

1.11 Temporary sheet piling which has been installed to permit the construction of a retaining wall shall not be removed until such wall has acquired its full strength.

1.12 Except in hard rock, excavations below the level of the base or footing of any foundation or retaining wall shall not be permitted unless the wall is underpinned and all other precautions taken to ensure the stability of the adjacent walls for the protection of the men.

1.13 Undercutting of earth banks shall not be permitted unless they are adequately shored.

1.14 Excavated material shall not be placed on the ground surface nearer than eighteen (18) inches from the edge of the excavation.

1.15 All fixed-in-place ladders and stairways giving access to levels twenty (20) or more feet apart shall be provided with landing platforms at vertical intervals of twenty (20) feet. Every landing platform shall be equipped with standard railings and toe boards.

1.16 Lumber sizes, when used in this Part, refer to nominal sizes.

SECTION 2 - PROTECTION OF THE PUBLIC

2.1 All public walkways, sidewalks, and thoroughfares bordering on or running through any construction site shall be provided with substantial guardrails or board fences. In addition, temporary footwalks beyond the curb shall be substantially constructed and provided with protection on both sides.

2.2 Sidewalks and walkways shall be kept clear of excavated material or other obstructions and no sidewalks shall be undermined unless shored to carry a live load of one hundred and twenty-five (125) pounds per square foot.

2.3 If planks are used for sidewalks or raised walkway protection, they shall be laid parallel to the length of the walk and fastened together against displacement.

2.4 Planks shall be uniform in thickness and all exposed ends shall be provided with beveled cleats to prevent tripping.

2.5 Raised walkways shall be provided with plank steps on strong strippers. Ramps used in lieu of steps shall be provided with cleats to insure safe walking.

2.6 A flagman or watchman shall be designated to warn the public of the approach of trucks and to direct the trucks in and out of the property. Danger or warning signs shall be posted at all truck entrances and exits.

2.7 During the hours of darkness, all public sidewalks and walkways shall be adequately illuminated, and warning lights or flares shall be placed about the property to ensure safety for pedestrian and vehicular traffic.

2.8 The public shall not be required or permitted to travel under loads handled by power shovels, derricks, or hoists, unless ample side barricades and overhead protection are provided.

SECTION 3 - SHEET PILING, SHORING, AND BRACING

3.1 All shoring, bracing, or sheet piling shall be consistent with the magnitude of the work and the character of the soil or material in which the excavation is made.

3.2 If workmen are engaged near the face of an excavation, where the ground is cracked or of such character that caving is likely to occur, sheet piling with shoring and bracing necessary to prevent caving shall be provided.

3.3 All materials used for shoring, bracing, and sheet piling shall be sound straight-grained timber equal to long leaf yellow pine, Douglas fir, or other material of equal strength. All timber shall be free from splits, shakes, large or loose knots, and shall be of the required dimensions throughout.

3.4 Wooden sheet piling shall be not less than two (2) inches in thickness and the thickness shall be increased as may be necessary to adequately support the sides of the excavation. (See rule 6.13)

3.5 Where temporary sheet piling is used during excavation work, the shoring and bracing to be provided shall comply with the following requirements.

3.6 When shores and braces are required they shall be placed at intervals of not more than eight (8) feet measured parallel with the sheet piling.

3.7 Shores or braces shall bear at the earth against a footing of sufficient area to keep within the allowable soil pressure, "dead men" being buried when necessary to resist the thrust of the braces.

3.8 Shores or braces at the sheet piling shall not be cut to a bevel but shall be held by wedges and the wedges shall be nailed.

3.9 The timber shores or braces shall be designed as columns, the following formula being recommended:

$$P = A(1300-20) \frac{L}{D}$$

Where: P = Total permissible load in pounds.

A = Cross sectional area of timber in square inches.

L = Unbraced length of timber in inches.

D = Least dimension of cross section of timber in inches.

3.10 The shores or braces shall make an angle not greater than thirty (30) degrees with the horizontal.

NOTE: For excavations more than sixteen (16) feet in depth, or when heavy lateral pressures are encountered, the use of interlocking steel sheet piling is recommended. Choice of piling should be made from recognized standard tables. Piling must be driven sufficiently below the bottom of the excavation to resist the overturning moment. Steel or timber bracing can be added where necessary.

SECTION 4 - JACKS

A. General

4.1 The rated capacity of every jack shall be legibly marked in a prominent location on the jack by casting or stamping.

4.2 To prevent loading beyond the rated capacity, the manufacturer shall designate in printed matter, or otherwise, the intended supporting point of the load and the maximum permissible length of lever and force applied.

4.3 If auxiliary load-supporting points are provided, the manufacturer shall also designate the rated capacity for these points.

4.4 The design of all jacks shall incorporate a positive stop to prevent over-travel or an indicator where a positive stop is impracticable.

4.5 The design shall be such that parts may be replaced without requiring special adjustment of either the replacement part or other parts of the jack.

4.6 Printed instructions concerning the lubrication and operation of the jacks shall be secured from the manufacturer.

4.7 Lubrication instructions furnished by the jack manufacturer shall be closely followed.

4.8 When the object has been lifted to the desired height, blocking or cribbing shall be immediately placed under it.

4.9 A capable man shall be appointed and held responsible for the inspection of all jacks at regular intervals. The inspection shall be made in accordance with rules governing "Inspection of Jacks" below.

B. Inspection of Jacks

4.10 Jacks shall be examined for cracked, distorted, or worn parts and to ensure that they are receiving proper lubrication. Time of examination shall depend upon service conditions as follows:

- (a) For constant or intermittent use at one locality, thorough inspection once every week,
- (b) For jacks shipped between shop and job, thorough inspection when sent out and when returned,
- (c) For jacks upon which abnormal load or shock has occurred, thorough inspection immediately, by foreman in charge.

4.11 Jacks which are found to have cracked, distorted, or badly worn parts shall be tagged "out of order" and not re-used until repairs are made.

4.12 Repair or replacement parts shall be examined for possible defects and only parts which fit perfectly shall be used.

4.13 Before being returned to service, repaired jacks shall be subjected to test and shall meet the same requirements as when new.

SECTION 5 - RAMPS AND RUNWAYS

5.1 Ramps or runways used for vehicles shall have a width of not less than twelve (12) feet. Timber guards not less than eight (8) inches by eight (8) inches shall be securely fastened on top of the runway along each of the outside edges.

5.2 Ramps or runways, when used as passageways for workmen, shall be provided with standard railings.

5.3 All ramps and runways shall be maintained in a safe and serviceable condition. When ramps and runways are formed on hard ground without the use of planking, ruts and holes greater than two (2) inches deep shall not be permitted.

5.4 When the pitch of the ramp requires it, a man shall be alongside a loaded truck with a chock provided with a strong handle for blocking a rear wheel if the truck is stalled or otherwise forced to stop on a ramp.

5.5 Workmen, other than chockers, shall be instructed to stay off ramps and runways when trucks are passing over them.

5.6 Where the incline of the ramp is too steep for safe walking, foot cleats, not more than sixteen (16) inches apart, shall be provided to prevent slipping.

SECTION 6 - TRENCHES

A. General Requirements

6.1 In all trench operations where men are at work or where they must pass to and from their work, sufficient light, either natural or artificial, shall be provided at all times.

6.2 Pick and shovel men working in trenches shall be kept a sufficient distance apart to prevent injury to one another.

6.3 No one man shall be allowed to work alone in a trench over four (4) feet in depth unless there is another person or persons in near attendance.

6.4 All trenches six (6) feet or more in depth shall at all times be supplied with at least one (1) ladder for each fifty (50) feet in length or fraction thereof. The ladder shall extend from the bottom of the trench to at least three (3) feet above the surface of the ground.

6.5 Red lanterns or torches shall be placed along the exposed sides of all trenches at night as required for necessary warning to the public.

6.6 Guardrailings or barricades shall be provided at or near the sides of trenches as necessary to protect the workmen and the public.

6.7 The sides of all trenches which are four (4) feet or more in depth, and where the earth is not sloped to the angle of repose, shall be securely held by timber bracing. The bracing shall be carried along with the excavation and must in no case be omitted unless the trench is cut in solid rock or hard shale.

6.8 Where a mechanical digger is used, the bracing shall be placed as close as possible (a maximum of six (6) feet is recommended) to the lower end of the boom.

6.9 The bracing shall be held in place by screw jacks or by cross braces cleated and wedged in place. Where the width of the trench prevents this, the lower end of the cross brace shall bear against a footing in the earth at the bottom of the trench, provided adequate means are taken to keep it from kicking out.

6.10 When the sloping of trenches to the angle of repose does not extend to the bottom of the trench, the timbering shall be as required to support the vertical part of the trench. The sheeting shall extend not less

than twelve (12) inches above the bottom of the slope and, if necessary, toe boards shall be placed behind the timbering to prevent material from sliding into the trench. The surface of the slope shall be cleared of boulders, stumps, or other hard masses of earth to eliminate the danger of their sliding into the trench.

6.11 Excavated material and superimposed loads shall not be placed nearer than eighteen (18) inches from the sides of the trench, unless bracing has been installed and designed to withstand the load.

6.12 When trenches are undercut, they shall be shored to safely support the overhanging material.

6.13 If a trench is cut alongside an existing structure and the footings of the structure are nearer to the trench than the plane of repose for the soil, they shall be underpinned or the side wall of the trench rigidly supported.

6.14 Considering the planks used for sheet piling as beams to support the load imposed by the lateral earth pressure, the maximum allowable distance between the horizontal stringers or wales shall be such as will keep the planks within their safe bending stress. (See Rule 3.4)

6.15 Where the cross section of the horizontal stringer or wale is not square, the greater dimension shall be placed in a horizontal plane to gain the maximum strength of the member.

6.16 Braces shall be considered as columns or struts and shall be of adequate dimension for stiffness. (See Rule 3.9)

6.17 In hand excavated trenches, cleats shall be spiked or bolted to join the ends of braces to stringers to prevent the braces from being knocked out of place. In mechanically excavated trenches, all cleats shall be bolted.

6.18 When the depth of the trench requires two (2) lengths of sheet piling, one above the other, the lower length shall be set inside the bottom stringers or wales of the upper length and driven down and braced as the excavation continues.

B. In Trenches of Varying Widths and Depths

In trenches of varying widths and depths the use of the following timbers is recommended and any deviations therefrom shall be on the side of safety.

6.19 For trenches from four (4) feet to ten (10) feet in depth and not more than forty-two (42) inches in width:

- (a) In hard solid soil
 - Uprights: 2 x 6 inch planks spaced approximately 6 feet apart c to c.
 - Stringers: None
 - Cross Braces: Two 2 x 6 inch planks for depths less than 7 feet.
 - Three 2" x 6" inch planks for depths 7' feet to 10' feet.

If the nature of the soil or parallel excavations close to trenches necessitate the spacing of uprights closer than six (6) feet, they may be

held in place by two by six (2 x 6) inch horizontal stringers or wales and cross braces spaced not more than six (6) feet apart c to c.

- (b) In soil likely to crack
Uprights: 2 x 6 inch planks spaced approximately 3 feet apart c to c.
Stringers: 2 x 6 inch planks placed near bottom and top of trench.
Cross Braces: Two 2 x 6 inch planks for depths less than 7 feet.
Three 2 x 6" inch planks for depths 7' feet to 10' feet.
Cross braces spaced horizontally not more than 6 feet apart c to c.
- (c) In soft sandy soil or filled ground
Uprights: 2 x 6 inch close sheeting
Stringers: 4 x 6 inch two for depths less than 7 feet, three for depths 7 feet to 10 feet.
Cross Braces: 4 x 6 inch spaced horizontally not more than 6 feet c to c.

6.20 For trenches from ten (10) feet to fifteen (15) feet in depth and not more than forty-two (42) inches in width:

- (a) In hard solid soil
Uprights: 2 x 6 inch planks spaced approximately 4 feet apart c to c.
Stringers: None
Cross Braces: Three 2 x 6 inch planks for depths less than 13 feet.
Four 2 x 6" inch planks for depths 13' feet to 15' feet.

In lieu of one cross brace to each upright, and where the nature of the soil or nearby parallel excavations makes the spacing of uprights closer than four (4) feet they may be held in place by two by six (2 x 6) inch stringers or wales and cross braces spaced not to exceed six (6) feet c to c.

- (b) In soil likely to crack
Uprights: 2 x 6 inch planks spaced 3 feet apart c to c.
Stringers: 2 x 6 inch planks, three in the height of the trench.
Cross Braces: Three 2 x 6 inch for depths less than 13 feet.
Four 2 x 6" inch for depths 13' feet to 15' feet.
Cross braces spaced horizontally not more than 6 feet apart c to c.
- (c) In soft sandy soil or filled ground
Uprights: 2 x 6 inch close sheeting
Stringers: 2 x 6 inch three for depths less than 13 feet, four for depths 13 to 15 feet.
Cross Braces: 4 x 6 inch spaced horizontally not more than 6 feet apart.

6.21 For trenches more than fifteen (15) feet in depth and not more than forty-two (42) inches in width:

- (a) In soil of all kinds
Uprights: 2 x 6 inch close sheeting
Stringers: 4 x 12 inch spaced vertically not to exceed 4 feet c to c.
Cross Braces: 4 x 12 inch spaced horizontally not to exceed 6 feet c to c.

6.22 For trenches from four (4) to ten (10) feet in depth, and more than forty-two (42) inches in width:

- (a) In hard solid soil
Uprights: 2 x 6 inch planks spaced approximately 6 feet apart c to c.
Stringers: 4 x 6 inches spaced vertically four (4) feet apart c to c.
Cross Braces: 4 x 6 inches spaced horizontally 6 feet apart c to c.
- (b) In soil likely to crack
Uprights: 2 x 6 inch planks spaced 3 feet apart c to c.
Cross Braces: 4 x 6 inch spaced horizontally 6 feet apart c to c.
- (c) In soft sandy soil or filled ground
Uprights: 2 x 6 inch close sheeting
Stringers: 4 x 6 inch two for depths less than 7 feet, three for depths 7 to 10 feet.
Cross Braces 4 x 6 inch spaced horizontally 6 feet apart c to c.

6.23 For trenches from ten (10) to twenty (20) feet in depth, and more than forty-two (42) inches in width:

- (a) In soil of all kinds
Uprights: 2 x 6 inch close sheeting
Stringers: 6 x 6 inch spaced vertically 4 feet apart c to c.
Cross Braces: 6 x 6 inch spaced horizontally 6 feet apart c to c.

6.24 For trenches more than twenty (20) feet in depth, and more than forty-two (42) inches in width:

- (a) In soil of all kinds
Uprights: 2 x 6 inch close sheeting
Stringers: 6 x 8 inch spaced vertically 4 feet apart c to c.
Cross Braces: 6 x 8 inch spaced horizontally 6 feet apart c to c.

C. In Trenches With Hydrostatic Pressure

6.25 For trenches not more than eight (8) feet in depth:

Uprights: 2 x 6 inch tongued and grooved close sheeting
Stringers: 6 x 8 inch spaced vertically 4 feet apart c to c.
Cross Braces: 6 x 8 inch spaced horizontally 6 feet apart c to c.

6.26 For trenches more than eight (8~ feet in depth:

Uprights: 3 x 6 inch tongued and grooved close sheeting
Stringers: 8 x 10 inch spaced vertically 4 feet apart c to c.
Cross Braces: 6 x 8 inch or 6 x 10 inch spaced horizontally 6 feet apart c to c.

The greater dimension of the stringers shall be placed at right angles to the sheeting.

6.27 Where desired, steel sheet piling and bracing may be substituted for wood.

SECTION 7 - POWER DRIVEN SHOVELS

A. General Requirements

7.1 The operator of every shovel shall be protected by a cab, screen or other suitable means in case a cable should break or material fall from a dipper when racked in close to the machine at a high level.

7.2 No unauthorized person shall be allowed on the operating platform when the shovel is in operation, and the machine operator shall not converse with anyone while operating the machine.

7.3 A suitable ladder or steps and handholds shall be provided to afford safe and easy access to the operating platform.

7.4 All shovels when not in use shall be left with the dipper on the ground.

7.5 In case of a breakdown, the shovel shall, if practicable, be moved well away from the foot of the slope before repairs are made.

7.6 All persons shall be warned to keep away from the range of the shovel's swing and avoid being struck by the cab as it rotates.

7.7 Workmen shall not be permitted to stand back of the shovel or in line with the swing of the dipper when the shovel is in operation or being moved.

7.8 The trucks of all power shovels, shall be inspected regularly, particular consideration being given to brakes and steering gear. All defects shall be promptly repaired.

7.9 Shovels shall be inspected each morning before starting work.

7.10 All oiling and greasing of equipment shall be done when the machine is shut down.

7.11 Operators shall not be permitted to leave the cab while the master clutch is engaged.

7.12 Whenever it is necessary to move the shovel under electric wires, ample clearance shall be provided, together with such precautions as may be necessary to prevent contact between any part of the shovel and the wires.

NOTE: Act 148 of Arkansas Acts of 1963 makes it unlawful to operate or move any part within six (6) feet of high voltage lines,

7.13 The wire rope on power-operated shovels shall be regularly inspected and shall be changed when ten (10) percent of the wires in any three (3) foot length are broken.

7.14 Sewer pipe may be lowered into ditch, but not layed with back hoe. At no time may men work under backhoe boom or load. Where impracticable or impossible to use other types of equipment to lay sewer pipe in trench, permission must first be obtained from the Commissioner of Labor or his authorized representative to use backhoe for this purpose.

B. Electric Shovels

7.14 All wiring and electrical apparatus shall be installed, equipped, and maintained according to the rules of the local code governing such equipment and all applicable rules of the National Electrical Code and the National Electrical Safety Code.

7.15 Temporary wiring shall be properly grounded to minimize the danger of shock.

7.16 In handling of electrical equipment, experienced electricians and operators shall be employed to do the work.

C. Steam Shovels

7.17 Steam boilers shall be installed, equipped, and maintained as provided in the Rules and Regulations of the Boiler Inspection Division of the State Department of Labor.

7.18 The boiler and all steam pipes shall be insulated, and all other necessary precautions taken to protect workmen from burns.

7.19 Before starting, the drip cocks in the pipes, leading from the boiler to the engine shall be opened and the cylinders and pipes drained.

7.20 Drains and blow-offs shall discharge under the shovel or the discharge pipe shall be shielded to protect persons passing or working near the shovel.

7.21 Every boiler shall be provided with safety valves, gage cock, and steam pressure gage.

D. Compressed-air and Gasoline Shovels

7.22 The compressor, air receiver, and other parts of all compressed-air equipment shall be installed, equipped, and maintained as prescribed by the local code and regulations governing such equipment, and the receiver shall comply with the ASME Code on Unfired Pressure Vessels.

7.23 Every compressor shall be provided with approved safety devices, including a safety valve, pressure gage, and fusible plug.

7.24 Air-receiver tanks shall be drained of moisture before starting compressor and periodically during operation.

7.25 Only a mineral oil having a high flash point shall be used for lubricating air compressors, and the quantity carefully regulated.

7.26 All automatic controls shall be inspected daily and kept in first class working condition.

7.27 Compressors shall always be supplied with a plentiful supply of cooling water kept in continuous free circulation, unless the compressors are air cooled.

7.28 Smoking in the vicinity of gasoline shovels shall be prohibited.

7.29 No lights other than approved vapor-proof incandescent electric lights shall be used in connection with gasoline shovels.

7.30 Gasoline shovels shall be effectively grounded and otherwise protected against the hazards of static electricity.

7.31 When transporting gasoline from the general supply to the equipment in five (5) gallon quantities or less, safety cans of the non-spill type shall be used,

7.32 If tank truck service is not available, gasoline in quantities in excess of five (5) gallons shall be transported in steel drums or barrels. All bungs shall be tight, and the drum chocked to prevent movement.

7.33 No open lights shall be used when transporting gasoline. Electric flash lamps only shall be used.

7.34 When gasoline is pumped from drum to storage tank on the equipment, a hose with a metallic nozzle shall be used. The pump must be of a type which does not create pressure inside the drum.

7.35 When gasoline is being pumped into the storage tank, the engine of the shovel shall be shut down.

7.36 A fire extinguisher of suitable type shall be placed on or convenient to every shovel or other similar piece of operating equipment.

7.37 Exhaust gases from all internal combustion engines shall be discharged into the outer air at a point where they will not contaminate the air in a working zone.

SECTION 8 - TRACTORS AND CARRYALLS

8.1 Tractor operators shall not get on or off machine while machine is in motion.

8.2 Tractors must be provided with an adequate locking device which will hold the machine stationary when left standing on a steep grade by the operator.

8.3 Operator shall not leave controls of tractor with master clutch engaged.

8.4 Tractors shall be equipped with a braking system able to stop and hold the maximum load on all grades negotiable.

8.5 Respirators, Bureau of Mines approved, shall be worn by operators when subject to harmful dust exposure.

8.6 Tractor motors shall be cranked only by operators or other experienced persons.

8.7 Riders, except mechanics and persons learning to operate tractors, shall not be allowed on tractor during working hours.

8.8 Winch lines shall at all times be in good condition and provided with spliced eye, knob or hook in working end, except under conditions where unspliced end is required.

8.9 No repairs on blade or dozer equipment shall be made unless motor has been stopped and dozer blade is resting on the ground or securely blocked. The same shall apply to carryall gates,

8.10 Bulldozer blades and carryall gates shall rest on the ground or on blocking when machines are not in operation.

8.11 Equipment shall not be moved onto unsafe ground, such as edges of deep fills, cutbanks, edges of excavations, etc.

8.12 Where excessive dust conditions are created, especially on haulage-roads such areas shall be frequently sprinkled with water to maintain dust at a minimum.

8.13 Equipment used where overhead hazards exist, or which are equipped with heavy duty winch on rear of machine shall be equipped with guards to protect the operator

SECTION 9 - TRUCKS

9.1 Only experienced and physically fit drivers shall be allowed to operate automobile trucks.

9.2 Brakes, steering gear, tires, and all operating parts of trucks shall be inspected daily; such inspections should, preferably be made before trucks are taken from the garage or storage area for the day's work.

9.3 All employees shall be strictly prohibited from: (2) riding on trucks unless authorized to do so, (b) riding anywhere on a truck except in the seat beside the driver, unless the truck body is equipped with fixed-in-place seats, a rear gate, and a safe means of getting on and off, (c) getting on or off moving vehicles.

9.4 Truck engines shall never be allowed to run idle in closed garages or other enclosed places.

9.5 All parts and accessories of trucks shall be kept in good repair and safe condition. Trucks with broken or cracked parts or defective tires shall be removed from service until the defects have been corrected.

9.6 On material which projects beyond the rear end of any truck using a public highway there shall be tied or fastened to the projecting end of the material: (a) A red flag during the daylight hours (b) A red light during the hours of darkness.

9.7 No person shall be permitted to remain on a truck when it is being loaded by a power shovel or to remain within reach of the swing of the dipper.

9.8 Material shall never be loaded on a truck so as to project horizontally beyond the sides of the body nor so that it can be jarred off due to vibration during transit.

9.9 Trucks while being loaded shall be properly blocked where there is a possibility of their moving by gravity, vibration from blasts, or other causes.

9.10 Loads not fully contained within the body of the truck shall be secured by means of chains, cables, ropes, or other effective devices.

9.11 The backing up of trucks shall be controlled by a signalman who, shall have clear view of the driver and the area behind the truck during each backing-up operation.

9.12 Completely deflated tires on trucks shall never be inflated until after the load has been removed by jacking up the truck. Truck drivers and mechanics shall be instructed in this procedure.

9.13 Dump bodies of dump trucks shall be blocked or cribbed before inspection, servicing, or repairing while hoisted.

SECTION 10 - WHEELBARROWS

10.1 Wheelbarrows with split or cracked handles shall not be used.

10.2 Wheels shall be strong, true running. and well secured to the frame.

10.3 When wheelbarrows are used in narrow passageways, knuckle guards shall be provided.

10.4 Workmen shall not be permitted to run with empty wheelbarrows with the handles in an upright position.

10.5 Wheelbarrows shall never be left in such a position that they can readily tip over or fall.

PART 3

WELDING AND CUTTING

SECTION 1 - GENERAL

1.1 Part 3 of this code contains the welding and cutting regulations needed for building construction operations. For information on any point which may be covered herein, reference should be made to Safety in Welding and Cutting Z49.1-1958 published by the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016.

1.2 All welding and cutting shall be performed by competent operators who have demonstrated their ability in accordance with the qualification procedures of the several applicable codes, such as the American Welding Society Code for Arc and Gas Welding in Building Construction and the American Standard Code for Pressure Piping ASA B31.1-1955

1.3 Only standard oxyacetylene equipment such as torches, pressure-reducing regulators, acetylene generators, etc., that have been examined,

tested, and found to be safeguarded as far as is practicable shall be used. (Most insurance companies and local authorities approve materials listed by Underwriters' Laboratories, Inc., Chicago, or approved and listed by Factory Mutual Laboratories, Boston, Mass.)

1.4 All cylinders used for the storage and shipment of compressed acetylene or oxygen shall be constructed in accordance with the specifications of the Interstate Commerce Commission, effective at the date of their manufacture, and maintained and charged with gas in accordance with these regulations. All cylinders shall be marked according to Interstate Commerce Commission requirements.

1.5 A suitable fire extinguisher or other effective means of fire extinguishment shall be ready for instant use in any location where welding or cutting is done. Where combustible materials are present near the welding operation, a helper, or an extra man, if necessary, should be on hand to extinguish fires.

1.6 Screens, shields, or other suitable safeguards shall be provided for the protection of men or combustible materials below or otherwise exposed to sparks or falling objects.

1.7 Tampering with, or attempting to repair safety devices or oxygen cylinder valves shall be prohibited. If trouble is experienced, a report should be promptly sent to the supplier, describing the character of the trouble and giving the serial number stamped on the cylinder. His instructions as to its handling and return should be followed.

1.8 When welding or cutting is performed on lead, zinc, or cadmium-coated or lead-bearing materials, provision shall be made for removal of welding fumes.

SECTION 2 - ARC WELDING

2.1 Only standard electric arc welding equipment such as generator units, prime motor-driven units, transformers, rectifiers, etc., which conform either to the requirements of the National Electrical Manufacturers Association or to the requirements of the Underwriters' Laboratories, Inc., or both, shall be used on building construction.

2.2 Power circuits for electric arc welding equipment shall be installed and maintained in accordance with all applicable rules of the National Electrical Safety Code.

2.3 Frames of all electric welding machines operated from power circuits shall be effectively grounded, with wire not lighter than No. 8 B & S gage.

2.4 The ground for the welding circuit shall be mechanically strong and electrically adequate for the service required.

2.5 Electrode and ground cables shall be supported so as not to create obstructions interfering with the safe passage of workers.

2.6 Where it is necessary to couple several lengths of cable for use as a welding circuit, insulated cable connectors shall be used on both the ground lines and the electrode holder line if occasional coupling or

uncoupling is necessary. For permanent use, soldered and taped splices may be used.

2.7 An electrode holder of adequate rated current capacity, insulated to protect the operator against possible shock and to prevent a short or flash when laid on grounded material, shall be used.

2.8 When arc welding is performed near other workmen, they shall be protected from the arc rays by screens or adequate individual eye protection.

2.9 Where welding sets operated by internal combustion engines are used in enclosed or confined spaces, suitable exhaust ducts shall be used for conducting exhaust gases to the outside atmosphere.

2.10 Welding operators and helpers shall be required to wear eye-protective devices as specified in Section 9 of Part 3.

SECTION 3 - ACETYLENE GENERATORS

3.1 Acetylene generators, if used, shall be installed and operated as specified in Pamphlet No. 51, Gas Systems for Welding and Cutting, published by the National Board of Fire Underwriters.

SECTION 4 - STORAGE AND USE OF CYLINDERS

A. General

4.1 Only cylinders, which carry markings to show that they comply with the regulations of the Interstate Commerce Commission shall be used for oxyacetylene service: Oxygen, ICC-3A; Acetylene, ICC-8.

4.2 Any local, state, or municipal regulations shall be closely observed relative to the storage of oxygen and acetylene cylinders.

B. Storage

4.3 Cylinders shall be kept away from any sources of heat. When placed inside the buildings, they shall be kept away from highly combustible materials such as oil or excelsior, and away from stoves, radiators, or furnaces.

4.4 Cylinders shall be stored in definitely assigned places away from elevators, gangways, or other places where they are likely to be knocked over or damaged by passing or falling objects.

4.5 Cylinders of oxygen shall not be stored in close proximity to cylinders of acetylene or other fuel gas inside of buildings. Unless well separated, there should be a fire-resisting partition between the oxygen cylinders and acetylene or fuel gas cylinders.

4.6 Where cylinders are stored in the open, they shall be protected from accumulations of ice and snow and from the continuous direct rays of the sun in locations where high temperatures prevail. Cylinders containing oxygen shall be placed well away from cylinders containing combustible gases. All cylinders shall be protected against excessive rise in temperature.

4.7 Empty cylinders shall have their valves closed. Valve protection caps, if provided for, should always be in place except when cylinders are in use or connected for use.

C. Handling

4.8 When moving cylinders by a crane or a derrick, a cradle, boat or suitable platform shall be used. Slings, hooks, or electric magnets shall not be used. Valve protection caps if provided for, must always be in place.

4.9 Cylinders may be moved by tilting and rolling them on their bottom edge; avoid dragging and sliding. When cylinders are transported on a hand truck, they should be held securely in position. Never drop cylinders or permit them to strike one another violently, or use them as rollers or supports, even when empty.

4.10 A suitable cylinder truck, chain, or other secure fastening shall be used to hold cylinders in place while in use.

4.11 Unless cylinders are secured on a special truck, regulators should be removed and valve protection caps, if provided for, should be put in place when cylinders are moved. Valves should be closed when work is finished, before moving cylinders, and on all empty cylinders.

4.12 Cylinders shall be kept far enough away from actual welding or cutting operations that sparks, hot slag, or flame will not reach them.

4.13 Cylinders must not be placed where they might form part of an electrical circuit. Contacts with third rails, trolley wires, etc., must be avoided. Keep cylinders away from radiators, piping systems, layout tables, etc., that may be used for grounding electrical circuits such as electric welding machines. Never permit an arc welding electrode to touch a compressed gas cylinder. Any practice such as the tapping of an electrode against a cylinder to free the electrode of slag must be prohibited.

4.14 Any attempt to mix gases in a cylinder, refill a cylinder, or use it for purposes other than intended by the supplier shall be prohibited.

D. Acetylene and Other Fuel Gas Cylinders

4.15 For storage in excess of 2,000 cubic feet total gas capacity of cylinders, a separate room or compartment shall be provided, or cylinders shall be kept outside or in a special building. Special buildings, rooms, or compartments shall have no open flame for heating or lighting, shall be well ventilated, and shall have no other occupancy, except that they may be used for the storage of calcium carbide. No smoking in such storage rooms shall be permitted.

4.16 The fusible safety plugs which are provided on all acetylene cylinders melt at about the boiling point of water. For this reason, should the outlet valve become clogged with ice, it should be thawed with warm--not boiling--water, applied only to the valve. A flame should never be used for this purpose.

4.17 Acetylene and liquefied fuel gas cylinders shall be stored and used with the valve end up, and not allowed to lie on their sides.

4.18 Fuel gas cylinders in which leaks occur shall be immediately taken out of use and handled in accordance with the following procedure:

4.18.1 The valve should be closed, the cylinder tagged and removed out of doors away from sources of flame or sparks, and the supplier notified. A regulator attached to the valve may be used temporarily to stop a leak through the valve seat.

4.18.2 If the leak occurs at the fuse plug or other safety device, tag the cylinder, remove it out of doors away from sources of flame or sparks, and leave the valve slightly open to permit the gas to escape slowly.

4.18.3 Warnings against approaching with lighted cigarettes or other sources of ignition should be posted, the supplier notified, and his instructions for returning the cylinder followed.

4.19 Acetylene cylinder valves should be opened slowly and to not more than one and one-half (1 1/2) turns of the spindle. They should be opened only with the special wrench provided by the supplier. This wrench should be left in position on the stem while the cylinder is in use so that it may be quickly turned off in case of an emergency.

4.20 The top of cylinder shall not be used as a receptacle for tools which may damage the safety devices in the head or interfere with the quick closing of the cylinder valve.

E. Oxygen Cylinders

4.21 Oxygen cylinders and fittings shall be kept away from oil or grease. (Oil or grease in the presence of oxygen under pressure may ignite violently.) Employees shall be prohibited from handling oxygen cylinders or apparatus with oily hands or gloves. Warnings shall be issued against permitting a jet of oxygen to strike an oily surface, greasy clothes, and against being directed into a fuel oil or storage tank that has contained a flammable substance.

4.22 The use of hammers and wrenches for opening oxygen cylinder valves shall be prohibited. If valves cannot be opened by hand, the supplier should be notified.

4.23 When a pressure reducing regulator is attached, the oxygen cylinder valve should be opened slightly at first so that the regulator cylinder pressure gage can move up slowly, after which the valve may be opened all the way. If the high pressure is suddenly released, it is liable to damage the regulator and pressure gages. The operator should be instructed to stand at the side of the regulator and not in front of the glass-covered gage faces when opening the cylinder valve.

4.24 When the oxygen cylinder is in use, the valve should be opened fully in order to prevent leakage around the valve stem.

SECTION 5 - COUPLING CYLINDERS

5.1 Manifolds or coupler blocks used to discharge either oxygen or acetylene from a number of cylinders through a common regulator shall be of

substantial design and capable of safely withstanding any pressure to which they may be subjected.

5.2 When acetylene cylinders are coupled, approved flash arrestors shall be inserted between each cylinder and the coupler block or between the coupler and regulator. Only acetylene cylinders of approximately equal pressure should be coupled together. Furthermore, it is recommended that each acetylene cylinder lead be provided with a check valve to prevent the rapid flow of acetylene from a full to an empty or partly empty cylinder connected in error. At least one valve key or handle shall be in place while the manifold is in operation.

5.3 The aggregate capacity of acetylene cylinders connected to a portable manifold inside a building shall not exceed 2,000 cubic feet of gas.

SECTION 6 - PRESSURE-REDUCING REGULATORS

6.1 Pressure-reducing regulators shall only be used for the gas for which they are intended.

6.2 Never use any gas from a cylinder without first attaching a suitable pressure-reducing regulator to the cylinder valve.

6.3 Before attaching a regulator, the cylinder valve should be opened slightly to clear the valve of dust or dirt, then closed.

6.4 In the case of oxygen, the pressure-reducing regulator should be closed by turning the pressure adjusting screw to the left (counterclockwise) until it turns freely, before opening the cylinder valve.

SECTION 7 - HOSE AND CONNECTIONS

7.1 Use only hose made especially for welding and cutting to connect any oxyacetylene torch to gas outlets. Metal-clad or armored hose is not recommended.

7.2 Hose connections shall be marked for identification, and, to prevent interchange and confusion, oxygen and acetylene hose shall be of dissimilar colors. Connections to fittings at both ends must be made in accordance with these markings.

7.3 Hose connections shall be made through substantial fittings and clamped or otherwise securely fastened to these connections in such a manner as to withstand without leakage a pressure twice as great as the maximum delivery pressure of the pressure regulators provided on the system. Connections between hose and nipple or gland may be either the ferrule or clamp type. It is important that these connections be kept tight.

7.4 Unnecessarily long lengths of hose should be avoided; when long lengths must be used, care should be taken that hose does not become kinked or tangled, and that it is protected from being run over by trucks, stepped on, or otherwise damaged.

7.5 All hose should be frequently inspected for leaks, worn places,

and loose connections. Immersing in water under normal working pressure is a satisfactory method of testing. When worn at a connection, the worn portion should be cut off and connections reinserted. Leaks should be repaired by cutting the hose and inserting a splice, repairing with tape shall be prohibited.

7.6 Any length of hose in which a flashback has occurred and burned in the hose shall be discarded. A flashback burns the inner walls and renders the hose unsafe for use.

7.7 A single hose having more than one gas passage, a wall failure of which would permit the flow of one gas into the other gas passage, shall not be used. When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than four (4) inches out of eight (8) inches should be covered with tape.

SECTION 8 - BLOW PIPES

8.1 Safety regulations for handling of blowpipes and torches should be enforced by all possible means, and the procedure given in this section carefully followed.

8.1.1 Select the proper welding head or mixer, tip, or cutting nozzle (according to the chart or table furnished by the torch manufacture) and screw carefully and tightly into the torch.

8.1.2 When changing torches, shut off gases at pressure-reducing regulators and not by crimping hose.

8.1.3 When the welding is to be stopped for a few minutes, it is permissible to close the torch valves only. Otherwise the cylinder valve should be closed and the regulator pressure-adjusting screw released.

8.1.4 Matches should not be used to light the torch. Friction lighters, stationary pilot flames, or some other suitable source of ignition should be used. Outlet of torch tip should be pointed so that burns or fires will not result when gas ignites.

SECTION 9 - EYE PROTECTION

9.1 Workers engaged in oxyacetylene welding or cutting shall be required to wear goggles, equipped with suitable filter lenses as specified in the American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs (ASA Z2.1-1959), National Bureau of Standards Handbook H24.

9.2 Workers engaged in electric arc welding shall be required to use shields or helmets, equipped with suitable filter lenses, as specified in the American Standard Safety Code for the Protection of Heads, Eyes and Respiratory Organs (ASA Z-2.1-1959), National Bureau of Standards Handbook H24.

9.3 All employees whose eyes are exposed to flying objects resulting from chipping or similar operations shall be required to wear goggles with

hardened lenses and sashes as specified in the American Standard Safety Code for the Protection of Heads, Eyes and Respiratory Organs (ASA Z2.1-1959), National Bureau of Standards Handbook H24. Employees doing arc welding should wear such goggles under hood for protection when the hood is raised.

9.4 Where continuous welding with the electric arc is carried on in a building the walls of the welding bay shall be painted flat black or other non-reflecting color to reduce reflection of the rays.

9.5 Where it is practicable, the welding operation should be enclosed in an individual booth painted with non-reflecting color such as zinc oxide and lamp black or shall be enclosed with portable screens similarly painted. Booths and screens shall permit circulation of air at floor level.

PART 4

PILING

SECTION O - DEFINITIONS

0.1 BEARING PILE. A "bearing pile" is a column of wood, metal or concrete or a combination of two (2) or more of these materials, driven, jacked, or sunk into the earth to transmit and distribute loads to strata below the surface.

0. 2 BEARING CAP. A "bearing cap" is either: (a) A slab or reinforced concrete or a heavy timber and plank platform covering the top of a group of piles for the purpose of tying them together and transmitting to them as a group the superimposed load, (b) A metal plate placed across the top of a tubular steel pile to distribute the load from the steel tube to the concrete.

0. 3 DRIVING CAP . A "driving cap" is a device placed on the top of a pile to prevent damage to the pile during the driving operation.

0. 4 WOOD PILE. A "wood pile" is a dimension timber or a pole formed from, and having the natural taper of the trunk of a tall tree.

0. 5 CAST-IN-PLACE CONCRETE PILE. A "case-in-place concrete pile" is either: (a) PEDESTAL TYPE - A "pedestal type" concrete pile is a cast-in-place pile with an enlarged (mushroom) base or foot. (b) TAPERED TYPE - A "tapered type" concrete pile is a cast-in-place pile cast in a tapered metal shell.

0. 6 PRECAST CONCRETE PILE. A "precast concrete pile" is one which is cast in a form above ground and driven to refusal.

0. 7 H PILE. An "H" pile is one formed of a structural steel column of "H" section.

0.8 STEEL-TUBE PILE. A "steel-tube pile" is a concrete-filled steel cylinder consisting of an open or closed-end steel tube or cylinder (usually not over twenty (20) inches in diameter) and driven to rock or refusal by means of a steam or pneumatic hammer.

0. 9 SHEET PILING. "Sheet piling" is a continuous vertical barricade consisting of squared timbers driven edge to edge, either square edged or tongued and grooved, or a series of interlocking steel shapes, to form a temporary wall about an excavation, and shored and braced as necessary.

0.10 PRE-TEST OR JACK PILE. A "pre-test or jack pile" is a steel cylinder driven in sections beneath an existing building and filled with concrete.

0.11 CAISSON PILE. A "caisson pile" is a concrete pile cast in an outer casing consisting of a series of telescoping steel tubes, the top section being the largest and usually twenty (20) inches or more in diameter.

0.12 COMPOSITE PILE. A "composite pile" is a pile which consists of a concrete pile superimposed on a wood pile.

0.13 PILE DRIVER. A "pile driver" is a device or piece of equipment used in driving piles.

SECTION 1 - INSTALLATION AND INSPECTION

1.1 The pile driver shall be firmly supported on heavy timber sills or substantial cribbing, and securely and safely guyed at all times, except where a crane or derrick is used for supporting the hammer.

1.2 All tools and pile-driving equipment shall be inspected before being placed in service and regularly inspected at frequent intervals thereafter. Pile lines, sheaves, and sheave pins shall be inspected daily and records of all inspections shall be kept during the life of the job on which the equipment is used.

1.3 Where steam or air hammers are used, the hose shall be securely lashed to the hammer to prevent it from whipping should a connection break.

1.4 Steam or air lines shall be controlled by shut-off valves located within easy reach of the operator.

1.5 Steam boilers shall meet the requirements of the rules and regulations of the Boiler Inspection Division of the State Department of Labor.

1.6 The main working platform on the pile driver shall be kept clear of ropes, tools, and materials.

1.7 The bolted connections of the driver frame shall be checked at least daily.

1.8 During operation there shall never be less than two (2) complete turns of cable around the drum of any pile driver.

1.9 When a pile driver is not in use, the hammer shall be checked at the bottom of the leads.

1.10 If hammers and pile line lead sheaves are used, protection shall be provided so as to prevent workers from being drawn into the sheaves.

1.11 Repairs shall not be made to any steam or air equipment while it is in operation or under pressure.

1.12 Hoisting drums and brakes shall be kept in safe operating condition and sheltered from the weather.

1.13 Engineers shall be prohibited from blowing condensation from a steam-driven apparatus while employees are in a nearby exposed position.

1.14 When compressed-air equipment is used, defective air hose shall be promptly replaced. Frequent inspections to locate defects should be required.

1.15 For information concerning the use of jacks, see PART 2, Section 4.

SECTION 2 - FLOATING RIGS

2.1 Where pile driving is done on the water from a trestle or from a floating rig, men shall be provided with kapok safety vests or jackets or the equivalent. Each rig shall be equipped with life preservers and lifelines for emergency use. On night operations, every alternate life preserver shall be equipped with electric water lights.

2.2 Sharp sand or other non-slip material shall be placed on decks during wet or icy weather. All gangways, ladders, stairways, and passageways shall be kept free of ice, snow, or grease. Screened cinders or other material shall be used where slippery surfaces cannot be avoided.

2.3 Decks shall be kept clean of unnecessary tools and materials at all times. Lines shall be coiled, tools stored, and materials stacked clear of working spaces.

2.4 Ladders or gangplanks shall be provided between each rig and the dock or pier except where the use of a boat makes this unnecessary. Such walkways shall be secured against slipping and every gangplank shall be equipped with standard handrails.

2.5 Deck hatches shall not be left uncovered unless completely enclosed by guardrails.

SECTION 3 - OPERATING RULES

3.1 Each member of a pile-driving crew shall be experienced or instructed in the work he is to do and shall be assigned his specific duties.

3.2 Engineers and winchmen shall be instructed not to accept signals from any one but a foreman or other person especially appointed to give signals. The Code of signals used shall be posted in an easily visible place.

3.3 The preparation of the piles shall be done at a safe distance from the pile driver and in no case closer to it than twice the length of the longest pile.

3.4 When piling is being hoisted into the leads, all men not on the pile-driving crew shall be kept at a safe distance from the equipment. This safe distance shall never be less than twice the length of the longest pile.

3.5 When piles are being driven in an excavated pit, the walls of the pit shall be sloped to the angle of repose or sheet-piled and braced.

3.6 When steel tube piles are being "blown out", employees and the public shall be kept well beyond the range of falling materials.

3.7 When steel piling or other metal is being cut by burning, the operator shall be required to wear goggles or a helmet designed to protect the eyes against harmful rays. (See PART 3, Section 9.)

3.8 When it is necessary to cut off the tops of driven piles, either steel or wood, driving operations shall be suspended except where the cutting operations are located at least twice the length of the longest pile from the driver.

3.9 When driving jacked piles, all access pits shall be provided with ladders and bulkheaded curbs to prevent material from falling into the pit.

3.10 Employees shall be instructed never to indulge in the following practices: (a) Snapping a rope taut to trip a man crossing it, (b) Shooting compressed air at a workman, (c) Starting any power equipment without making certain that other workmen are clear of it and otherwise warned.

SECTION 4 - SHEET PILE COFFERDAMS

4.1 Steel sheet piling cofferdams, constructed in whole or in part from floating rigs, present extreme safety hazards. All personnel working over water shall be required to wear life vests.

4.2 When handling steel sheet sections, especially with wind blowing, tag lines shall be attached to the lower end to provide guidance.

4.3 When interlocking sheets, the top man usually sits astride the driven section in order to guide new sections into place. Foot stirrups that hook over the top of the driven sheets are recommended for use in this work. Hands shall be placed well upon section being set, and gloves shall be worn at all times.

4.4 In current the bottom of the sections may require cables or bracing to maintain vertical alignment until sheet has been driven far enough to withstand pressure.

4.5 To protect cofferdam from undercutting by current a substantial beam shall be placed along the up-stream, long side, and outer ends of cofferdam. This is usually a design function, but care shall be taken by the contractor to inspect frequently for washing away. Scour may require pumping sand, or placing of brush and rock weighted mattresses.

4.6 Adequate pumping capacity shall be provided to maintain dry condition, and to meet emergency conditions.

4.7 As protection against unexpected flooding or collapse, substantial stairways at strategic points shall be provided for the evacuation of personnel working in the dewatered area. Life preservers and personnel boats shall be posted on the shore and along the top of the completed cofferdam.

4.8 Continual inspection of the cofferdam, close study of upstream water levels and weather conditions are strongly recommended.

4.9 If navigation is carried on in the vicinity of the cofferdam, adequate warning lights shall be provided.

4.10 Removal of sections, especially in current, is perhaps more hazardous than the original installation.

4.11 Rust and dirt deposits in the interlocks, in addition to deformations resulting from driving, will require extreme effort in extracting.

4.12 Extractor hooks, cables, and the boom are subjected to severe stresses, and a greater factor of safety than for normal operations shall be used.

4.13 Extractor hooks shall be carefully inspected for signs of failure.

4.14 It is advisable to lock the screw bolt in the extractor pin with a spring clip, as the constant vibration may loosen the bolt.

4.15 Sheet sections extracted in current shall be secured against lateral movement by cables or guide devices.

PART 5

HANDLING AND STORING MATERIALS

SECTION 1 - GENERAL

1.1 All material in bags, containers, or bundles, and other material stored in tiers shall be stacked, blocked, interlocked, and limited in height so that it will be stable and otherwise safe against sliding or collapse.

1.2 Material stored inside buildings under construction shall not be placed within six (6) feet of any hoistway or floor opening, nor on any floor above the ground, within ten (10) feet of the outside of any building unless the exterior walls extend above the top of the storage pile, in which case the minimum distance shall be six (6) feet.

1.3 When any material is stored in public thoroughfares, it shall be located so as to present the least possible hazard to, and interference with traffic and the public.

1.4 The material shall be protected against being hit or knocked over by trucks or other passing vehicles by means of barricades and red flags during the hours of daylight.

1.5 The material shall be guarded at night by barricades and an adequate number of red lights located at conspicuous points.

1.6 Children shall not be allowed to play on or around the material.

SECTION 2 - PILING OF LUMBER

2.1 All lumber shall be piled on timber sills to prevent direct contact between stored lumber and the ground.

2.2 Sills shall be level and solidly supported.

2.3 Lumber shall be so piled as to be safe against falling or toppling over, and the piles shall be not less than four (4) tiers wide, and when unplied all tiers shall be unplied simultaneously.

2.4 Cross strips shall be placed in piles which are stacked more than four (4) feet high.

2.5 Used lumber shall have all nails withdrawn before it is piled unless it is to be burned without further handling.

SECTION 3 - CEMENT AND LIME

3.1 Bags of cement and lime shall not be piled more than ten (10) bags high except when stored in bins or enclosures built for such purposes.

3.2 The bags around the outside of the piles shall be placed with the mouths of the bags facing the center of the pile.

3.3 To prevent piled bags from falling outward, the first five (5) tiers of bags each way from any corner shall be cross-piled and a set-back made commencing with the sixth tier. If necessary to pile above the tenth tier, another set-back shall be made starting with the eleventh

3.4 The back tier, when not resting against a wall of sufficient strength to withstand the pressure, should be stepped back one bag in every five (5) tiers, the same as the end tiers.

3.5 During unpling, the entire top of the pile shall be kept level and the necessary step-backs every five (5) bags maintained.

3.6 Men handling cement and lime bags should be required to wear goggles and snug-fitting neck and arm bands.

3.7 Men shall be warned against wearing clothing that has become hard and stiff with cement. Such clothing irritates the skin and may cause serious infection.

3.8 Men shall be instructed to report any susceptibility of their skin to cement and lime burns and shall be encouraged to practice personal cleanliness. Men who are allergic to cement and lime should be transferred to other jobs.

3.9 A hand cream or vaseline shall be provided to workmen where its use will prevent burns.

3.10 Lime shall be stored in a dry place to prevent a premature slacking action that may cause fire.

SECTION 4 - BRICK

4.1 Brick shall never be piled on uneven or soft ground but should always be stacked on planks, except where the surface is of asphalt or concrete.

4.2 Brick shall never be stacked for storage purposes on scaffolds or runways. This shall not prohibit normal supplies on bricklayers' scaffolds during actual bricklaying operations.

4.3 Except when stacked in sheds, brick piles shall never be more than seven (7) feet high.

4.4 When a pile reaches a height of four (4) feet it shall be tapered back one (1) inch in every foot of height above four (4) foot level.

4.5 The tops of brick piles shall be kept level and the taper maintained during unpling operations.

4.6 Power saws used for cutting brick or stone, shall be provided with effective dust control. Men using saws shall wear goggles. Power switches shall be so placed that the operator does not have to reach across the blade to start or stop the motor. The saw shall also be provided with an effective ground.

SECTION 5 - FLOOR, WALL, AND PARTITION BLOCKS

5.1 Blocks shall always be stacked in tiers on solid, level surfaces.

5.2 Stacked piles shall be limited to a height of six (6) feet whenever possible.

5.3 When blocks are stacked higher than six (6) feet, the pile shall be stepped back, braced, and propped, or wood strips placed between tiers to prevent the pile toppling.

5.4 Blocks shall not be dropped or thrown from an elevation or delivered through fully enclosed chutes.

SECTION 6 - REINFORCING AND STRUCTURAL STEEL

6.1 Reinforcing steel rods shall be stored in separate piles according to length and size.

6.2 Men handling reinforcing steel shall be required to wear heavy gloves.

6.3 Bending of reinforcing steel on the job shall be done on substantial benches secured against tipping. Benches shall be located on non-slippery level surfaces.

6.4 Structural steel shall be carefully piled to prevent danger of members sliding off or the pile toppling over. Unless there is no danger of tipping over, I beams shall never be stored with the webs vertical.

SECTION 7 - CORRUGATED AND FLAT IRON

7.1 Corrugated and flat iron shall be stacked in fat piles, with the piles not more than four (4) feet high.

7.2 Spacing strips shall be placed between bundles.

SECTION 8 - PIPE

8.1 Pipe of all kinds shall be stacked and blocked in such a way as to prevent the stack from spreading.

8.2 In removing pipe larger than two (2) inches in diameter from storage piles in which the pipes all run in the same direction and more than one pipe high, employees shall be instructed to approach the pile from the ends and not from the sides.

8.3 If piled, sewer pipe shall be arranged with the sizes ranging from large to small from the bottom to the top of the pile, and the height of any pile shall not exceed five (5) feet.

SECTION 9 - SAND, GRAVEL, AND CRUSHED STONE

9.1 In withdrawing sand, gravel, and crushed stone from frozen stock piles, no overhanging shall be permitted to exist at any time.

9.2 Material dumped against walls or partitions shall not be stored to a height that will endanger the stability of such walls and partitions.

9.3 When men are required to work in hoppers or on high piles or loose material they shall be equipped with life lines and safety belts.

9.4 Approved type respirators shall be worn in confined, dusty atmospheres.

PART 6

BLASTING

SECTION O - DEFINITIONS

0.1 BLASTER. The term "blaster" shall mean any person designated to supervise blasting operations, and who shall be charged with the responsibility of preparing and fixing charges, firing, approaching misfires, and thawing explosives.

0.2 CHASSIS. This shall mean and include the entire vehicle exclusive of the body or any load thereon.

0.3 DETONATOR. The term "detonator" as used in this code shall include igniters, blasting caps, electric blasting caps, or other similar devices used to explode commercial explosives.

0.4 DRIVER. This shall mean and include any person who operates a motor truck, or drives a vehicle.

0.5 EXPLOSIVES. The term "explosives" as used herein shall be held to mean and include gun powder, powders used for blasting, all forms of high explosives, blasting material, detonators and other detonating agents, smokeless powders, and any chemical compounds or mechanical mixtures that contain any oxidizing and combustible units or other ingredients in such proportions, quantities, or packing that ignition by fire, by friction, by concussion, by percussion, or by detonation of the compound or mixture or any part thereof may cause an explosion. (Definition from Federal Explosives Control Act).

0.6 FUSE. This term, as used in this code, shall mean the slow-burning commercially used blasting fuse, usually consisting of a core of powder, over-spun with yarns and tapes, and which also may be treated with a waterproofing compound, and intended to convey fire to the blasting cap or explosive mass without danger to the person lighting it.

0.7 HIGHWAY. This shall mean and include all public roads, streets, avenues, alleys, boulevards, parks and squares, also bridges and approaches thereto.

0.8 MAGAZINE. This shall mean any building or other structure used for the storage of explosives.

0.9 MOTOR TRUCKS. This shall mean and include all vehicles operated or propelled by any form of engine, motor, or mechanical power, and designed or used for carrying freight or merchandise.

0.10 PRIMER. The term "primer" as used in this code shall mean a cartridge of explosives to which a detonator has been attached as a means of firing, and intended to be placed in the bore hole or other explosives chamber for the purpose of exploding the remainder of the charge.

0.11 RAILROAD. This shall mean and include any steam, electric, or other railroad which carries passengers, freight, or merchandise.

0.12 VEHICLE. This shall mean and include any vehicle drawn by animals and designed or used for carrying freight or merchandise.

SECTION 1 - GENERAL

1.1 It is the purpose of this code to provide all necessary in-

formation to enable the contractor to effect safe working conditions under normal circumstances. However, all persons engaged in construction must determine whether there are existing local, state or municipal codes which are applicable and, if so, where such codes or ordinances call for a higher degree of safety than demanded by this code they shall be strictly adhered to.

1.2 At the beginning of some sections in this PART will be found a reference to other authoritative text work. These references are included to provide a source of information should more detailed information be required under any condition.

SECTION 2 - STORAGE AND HANDLING OF EXPLOSIVES

2.1 If information is desired on any point not covered herein, reference should be made to the following text works: Pamphlet No. 1, Standard Storage Magazines, issued by the Institute of Makers of Explosives; Pamphlet No. 17, Safety in the Handling and Use of Explosives, issued by the Institute of Makers of Explosives.

2.2 Explosives, detonators, and fuses shall be stored in bulletproof, fire-proof, and weatherproof magazines of an approved type.

2.3 Locations of magazines in relation to other building or public facilities shall conform to the American Table of Distances which is reproduced in abbreviated form on Page 52.

2.4 Magazines shall be fenced in or barricaded where advisable to protect them from trespassers. The area around the magazines shall be cleared and kept free from vegetation. Ventilation shall be provided and the outlets of ventilating ducts shall be screened.

2.5 The magazines shall be kept locked except when being inspected or when the explosives are being placed therein or being removed therefrom, and the key shall be in charge of a reliable and competent person who shall be in charge of explosives and the magazines and their contents.

2.6 Explosives shall not be stored in any magazine that is nearer than three hundred (300) feet to a schoolhouse, church, hospital, theatre, or other place of public assembly.

2.7 Magazines in which explosives are stored shall not be used for any other purpose. Inflammables, tools, or any materials, other than explosives shall not be stored in an explosive magazine.

AMERICAN TABLE OF DISTANCES

EXPLOSIVES		DISTANCES IN FEET WHEN STORAGE IS BARRICADED			
Pounds Over	Pounds Not Over	From Inhabited Buildings	From Passenger Railways	From Public Highways	Separation Magazines
2	5	70	30	30	6

5	10	90	35	35	8
10	20	110	45	45	10
20	30	125	50	50	11
30	40	140	55	55	12
40	50	150	60	60	14
50	75	170	70	70	15
75	100	190	75	75	16
100	125	200	80	80	18
125	150	215	85	85	19
150	200	235	95	95	21
200	250	255	105	105	23
250	300	270	110	110	24
300	400	295	120	120	27
400	500	320	130	130	29
500	600	340	135	135	31
600	700	355	145	145	32
700	800	375	150	150	33
800	900	390	155	155	35
900	1000	400	160	160	36
1000	1200	425	170	165	39
1200	1400	450	180	170	41
1400	1600	470	190	175	43
1600	1800	490	195	180	44
1800	2000	505	205	185	45
2000	2500	545	220	190	49
2500	3000	580	235	195	52
3000	4000	635	255	210	58
4000	5000	685	275	225	61
5000	6000	730	295	235	65
6000	7000	770	310	245	68
7000	8000	800	320	250	72
8000	9000	835	335	255	75
9000	10000	865	345	260	78

*Barricaded, as here used, signifies that the building containing explosives is screened from other buildings, railways, or from highways by either natural or artificial barriers. Where such barriers do not exist, the distance should be doubled.

2.8 Stored explosives shall be used in the order of delivery. Boxes of explosives when in storage shall be placed in such a position that the cartridges will not stand on end.

2.9 Explosives shall not be stored where there is a possible accumulation of static electricity, especially if there is dust from the explosives or other organic matter present. Explosives shall be stored in original containers only. Boxes or packages containing explosives shall be opened, packed, or repacked only at a distance of at least fifty (50) feet away from any magazine.

2.10 Every magazine containing explosives shall be kept cool, dry, and clean, and be painted bright red with the words "MAGAZINES--DANGER--EXPLOSIVES" distinctly painted in black letter at least six (6) inches high on all four (4) sides and on top of each magazine, and if the magazine is located in an isolated place, the walk, pathway, or roadway leading to it shall be marked with appropriate "CAUTION" and "DANGER" signs.

2.11 Primed cartridges (cartridges with detonator attached) shall not be stored in a magazine.

2.12 Magazine floors shall be swept regularly and kept clean.

2.13 No matches, cigarette lighters, or open flames shall be carried by any person on the premises in which explosives are stored and no smoking shall be allowed within twenty-five (25) feet of explosives.

2.14 There shall be placed in a conspicuous location in any magazine containing explosives, a copy of the permit issued by the department or governmental body having jurisdiction, covering the licensing of the magazine, the work, and the blaster.

2.15 If a leak develops in magazine roof or walls, repair it at once; and if repairs on the inside are necessary, all explosives shall first be removed to a safe distance and protected. Detonators shall be stored in a separate magazine at least one hundred (100) feet distant from the dynamite or powder magazine. If the magazine is properly barricaded, the distance may be reduced to fifty (50) feet. All magazines for detonators shall be above ground and properly protected against molestation.

2.16 Detonators shall never be stored in the same magazine with other explosives such as powder or dynamite.

2.17 Fuses shall not be capped with detonators in a magazine or in any other place where detonators or other explosives are stored.

2.18 Do not leave boxes of explosives open in a magazine.

2.19 The handling of explosives shall be entrusted only to experienced and competent men. The manufacturers' instructions for the safe handling and storage of material are enclosed in each box of explosives and shall be observed.

2.20 Explosives containers shall be opened with care, using tools of non-ferrous material except where covers are screwed on, then use only a screwdriver, and with care.

2.21 Cartridges shall only be removed from the boxes as they are needed for immediate use and carried to the operation in a non-metallic container. A person other than the one carrying the explosives shall carry the caps, tamping sticks, and fuse. Explosives not used shall be returned promptly to the magazine. Storage shall not be permitted on the project unless a proper magazine is provided and properly protected.

2.22 Any cartridge showing glycerine, crystals, or stains on the outside shall not be used.

2.23 Shoes with nails or metal plates that would cause friction sparks shall not be worn in a magazine or around explosives.

2.24 Blasting caps or electric blasting caps shall not be carried in pockets of clothes.

2.25 No attempt shall be made to use dynamite that is frozen.

2.26 If it is necessary to use small quantities of dynamite which have been frozen, a portable thawer may be used, consisting of a water-jacketed metal vessel closed with a tin cover. The water, before being poured into the vessel, should be heated to a temperature not uncomfortable to the immersed hand. The temperature, however, should exceed 130° F.

2.27 If necessary to thaw large quantities of dynamite, a suitable thaw house should be constructed and used in accordance with the recommendations of the United States Bureau of Mines. A greater quantity of dynamite than is sufficient for daily use should not be thawed out at one time.

2.28 When using powder for blasting, always close the can or package after taking out the amount of powder needed.

2.29 All artificial lights used shall be of an approved explosion proof type. If electric flash lamps are used, they should be so constructed that it will not be possible to obtain a difference of potential between any two (2) points on the outside of the lamp casing.

2.30 Building in which fuse is stored should be dry and temperature should be kept between 45° F and 75° F. Storage of fuse in a damp place retards its burning speed, and fuse that is stored underground is never in prime condition.

SECTION 3 - TRANSPORTATION OF EXPLOSIVES

3.1 In any case where more detailed and specific information is desired, reference should be made to the following two pamphlets published by the Institute of Makers of Explosives: Pamphlet No. 5, Rules for Handling, Storing, Delivering, and Shipping Explosives; Pamphlet No. 16, The Transportation of Explosives over State Highways.

3.2 All rules of the Interstate Commerce Commission which have been, or may be, promulgated should be observed and obeyed.

3.3 Trucks used for the transportation of explosives shall be of ample capacity to carry the maximum load and be maintained in first class running condition. All electric wiring shall be completely protected and securely fastened to prevent short circuiting.

3.4 To reduce fire hazard and risk of explosion, the motor truck or vehicle shall have a close, tight floor, and any exposed metal on the inside of the body shall be covered or protected with non-sparking material, so that the explosive contained will not come in contact with any exposed metal.

3.5 Trucks used exclusively for the transportation of explosives shall be painted or marked permanently with the word "DANGER--EXPLOSIVES" in letters at least six (6) inches high painted on both sides, and the name or trademark of the company or individual operating it. When a truck is used occasionally for transporting explosives, it shall carry signs or placards on both sides and on the rear bearing similar wording. All trucks transporting explosives shall display a red flag of sufficient size (to be seen at a

reasonable distance) marked with the words "DANGER--EXPLOSIVES" in white letters at least six (6) inches high. Caps and dynamite shall not be transported in the same vehicle.

3.6 When explosives are carried on a motor truck or vehicle without a top, they shall always be protected from the sun and weather by a tarpaulin.

3.7 Trucks used for transporting explosives shall be inspected daily (and a record of such inspection kept) in order to determine that: (a) All fire extinguishers are filled and in good working order, (b) Electric wiring is effectively insulated and firmly secure, (c) Chassis, engine, pan, and bottom of body are clean and free from surplus oil and grease, (d) Gasoline tank and feed line from same have no leaks, (e) Brakes and steering apparatus are in good condition, (f) Truck is in proper condition in all other respects for handling explosives.

3.8 Explosives shall not be transported in a trailer, nor shall any trailer be attached to a motor truck hauling explosives.

3.9 The gasoline tank of a motor truck shall not be filled while explosives are on the truck except in an emergency, and then only after the engine is stopped and all lights extinguished.

3.10 No person other than the driver and an authorized companion or helper shall be permitted to ride on trucks transporting explosives.

3.11 Trucks containing explosives shall never be left parked without first stopping the motor, securely setting the brakes, leaving in gear, and if on other than level ground, blocking the wheels.

3.12 Trucks containing explosives shall never be taken into a garage or repair shop, or parked in congested areas, nor stored overnight or at any other time in a public garage or similar building.

3.13 In unloading, packages of explosives shall not be piled immediately back of the exhaust, as a spark may start a fire and cause an explosion.

3.14 Drivers should be required to avoid all unnecessary stops. Stops for meals should be made only at a sideway restaurant and the motor truck or vehicle parked well away from traffic, fire risk, and other parked vehicles.

3.15 Trucks transporting explosives shall be equipped with not less than two (2) fire extinguishers placed at convenient points, filled and ready for immediate use, and of a make approved by any nationally recognized, standard testing laboratory which possess adequate equipment, experience, and competency in this field.

3.16 In transporting explosives from magazines to working places, explosives and detonators should be kept apart until the last possible moment. They should not be transported in the same conveyance; if this is done, the conveyance should be provided with separate insulated compartments with door opening on opposite sides.

SECTION 4 - DRILLING

4.1 All drill holes shall be of sufficient diameter throughout their length to permit free insertion of a cartridge without the necessity of undue ramming or removing the original wrapper from the dynamite.

4.2 The holes shall be made ready before the dynamite is brought to the work and the operations of priming, charging, tamping, and firing carried on with a minimum of man exposure and as rapidly as is consistent with careful work.

4.3 No person shall be allowed to deepen holes that have previously contained explosives.

4.4 Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges.

4.5 Drilling shall not be resumed after blasts have been fired until a thorough examination has been made to make sure that there are no unexploded charges remaining.

SECTION 5 - LOADING

5.1 In loading small-diameter bore holes, tamping shall be done with a wooden stick having no metal parts, and pressure exerted only when necessary--never a quick, sharp blow.

5.2 All holes or charges shall be checked and definitely located before firing.

5.3 When holes are sprung, leave ample time between springing shots for the hole to cool, and also between the last springing shot and the loading of the main charge.

5.4 Electric detonators should be used for springing charges as the use of short pieces of fuse may result in the charge exploding before the blaster is a safe distance away from the hole.

5.5 Provision shall be made to segregate drilling and loading operation.

SECTION 6 - PREPARATION FOR BLASTING

6.1 Caps shall be fastened to fuses by means of a crimping tool made especially for that purpose. The use of the teeth or knife is prohibited.

6.2 Fuse shall be selected to conform to the condition existing on the operation. Where wet drilling is being done, a tape-covered fuse shall be used, the grade depending upon conditions in regard to temperature and moisture. Where acid is present in sufficient quantities to make it necessary to line pumps with acid-resisting materials, a triple tape fuse should be used, the kind depending upon conditions of temperature and moisture.

6.3 Blasters shall test circuits through charged holes by use of only approved types of galvanometers. No tests of circuits in charge holes shall be made until men are removed to a safe distance. Lead wires shall be of sufficient length to permit testing from a safe distance. If electric detonators are used, the legs of these devices shall be short circuited by twisting the naked ends together and shall remain so twisted until ready to be connected to the firing line.

6.4 Before a blast is fired, the rock or other substance to be shattered shall be covered with a blasting mattress or other means, if necessary, to protect workmen, the public, or property from injury or damage from flying rocks.

6.5 If hand battery is used it shall be tested daily and kept in good mechanical condition. No leads shall be connected to a blasting machine until just before the shot is to be fired.

6.6 No blast shall be fired with fuse in vertical or steep shafts.

6.7 When blasting is done by electricity from power circuits the voltage shall not exceed two hundred and fifty (250) volts. In addition, the wiring and controlling arrangements shall conform to the four following requirements.

6.7.1 Wiring circuits for blasting shall be used for no other current-carrying purpose.

6.7.2 Blasting circuit wires shall not cross over or under other overhead electrically charged wires.

6.7.3 Blasting operation controls shall consist of two (2) safety switches (a safety switch and a firing switch) located at least six (6) feet apart and connection between the switches to be made by a plug-in jumper which cannot be plugged into the firing switch without unlocking it and which must be removed to lock the switch.

6.7.4 Switches shall both be of a locking, double pole, double throw type, which are opened and locked in the downward position which short circuits the leading wires when in the open position. Jumper may be permanently attached to the safety switch.

6.8 When a shot is about to be fired, all persons near the place shall receive ample warning and the fuse shall not be lighted or the blast detonated until it is absolutely certain that every person has retreated to a safe distance not less than five hundred (500) feet and no one remains in a dangerous position.

6.9 Where blasting is to be done without adequate natural shelters being available, shelters shall be built in accordance with any existing local or state codes where such codes exist. Where no code governs, they shall be built as required by conditions to protect men against any fragments which may reach the shelter.

6.10 Definite places of shelter shall be assigned to various crews of workmen, and foremen shall be responsible for seeing that men go to designated shelters.

SECTION 7 - INSPECTION AFTER BLASTING

7.1 After a blast has been fired, the blaster shall make a minute inspection to determine if all charges have exploded before employees are allowed to return to the operation.

7.2 In firing a round of holes, blaster shall count the number of exploding shots (except in case of instantaneous blasting by electricity and if there are any misfires, he shall not permit men to return to the operation until such misfires have been exploded or such holes made safe. Allow at least one (1) hour after the charge fails to explode before it is examined.

7.3 All wires in broken rock shall be carefully traced and search made for all unexploded charges.

7.4 The foreman in charge or other authorized person shall inspect the working area and have all loose rock or ground removed and the area made safe before proceeding with the work.

7.5 After blasting from electrical circuits, the jumper shall be removed from between the safety switch and the firing switch and the switches locked before any person is allowed to return to the working area and the keys to the switches shall remain in the possession of the blaster at all times.

7.6 After the blast is fired, loose pieces of rock shall be scaled from the sides of the excavation and the entire working chamber thoroughly scaled.

SECTION 8 - MUDCAPPING

8.1 Mudcap blasts may be fired with either cap and fuse or electric blasting caps. If the blasting is done near a road where traffic passes, electric firing is safer, since watchmen can be posted to stop traffic at a safe distance immediately before blasting and permit it to proceed immediately thereafter with danger of being hit by flying fragments from a belated cap and fuse blast.

8.2 When fuse is used in setting off mudcapped charges, a corded fuse should be selected, especially during winter.

SECTION 9 - MISFIRES

9.1 Misfires shall be placed under the direction of careful and experienced workmen, who shall make their examination in a slow, methodical manner before beginning the work of re-priming.

9.2 When electrical blasting caps are used, and one or all of the holes fail, the lead wires shall be disconnected from the blasting machine, and carried back at least half of the distance from the blasting machine to the area being shot over. The lead wires shall be left in this position until all inspection and checking work has been completed.

9.3 The investigation should consist first of a search for broken wires, faulty connections, or short circuits. If such are found, the proper repairs should be made, the leading wires reconnected, and the blasting machine again used. Many so-called failures are the result of poor connections or connections being made in contact with wet ground, or other conductive material.

9.4 When caps and fuses are used, greater care shall be exercised. It is never safe to go back immediately after a delayed shot that is primed with a cap and fuse. The interval of waiting should be at least one (1) hour.

9.5 The charge of explosives from a misfired hole shall not be drilled, bored, or picked out. Where required by law, drill and charge another bore hole at least two (2) feet from the missed one. If this is done, a careful search should be made for unexploded material in the debris.

9.6 When a well-drill hole fails to fire, it falls into one of two classes: first, holes which are so located that the total charge can be fired without danger to life or property; or second, holes from which the original shot has robbed part or all of the burden so that the firing of the charge would be a hazard. A different procedure should be followed in each case.

9.6.1 In the first class: if the charge cannot be fired by a second application of the current, the next expedient is to insert a fresh primer.

9.6.1.1 If the distance from the collar of the well-drill hole to the top of the explosive charge has been measured in loading, and the tamping is of good clay free from grit, a hole large enough to take a one and one-quarter (1 1/4) inch diameter cartridge may be made in the tamping within an inch or two of the top of the charge by means of a hard wood bar, and the hole then loaded with several cartridges of the strongest and quickest dynamite available. It then should be tamped and fired.

NOTE: This method, which rarely fails to explode the missed charge, required the greatest care, and if the tamping is softened by adding a little water from time to time as the auxiliary hole is deepened, the work will be easier.

9.6.1.2 If tamping consists of sand or screenings, it is not easy to put a hole through it, and the tamping generally must be removed from the hole. This can be done with a prospect auger or small post hole digger of non-ferrous material.

NOTE: In using such a tool, care shall be exercised as the charge is neared, so as not to bore into the explosive. After tamping is removed, a new primer then may be lowered into the hole.

9.6.1.3 Sand tamping also can be blown out of a well-drill hole by compressed air. The best method of doing this is to put down a two (2) inch pipe in the center of the hole, and blow out only the sand which rises in the pipe.

NOTE: This pipe serves as a casing, and should be left in the hole to prevent the remainder of the sand from falling in. The new primer then

may be pushed down through the pipe until it is in contact with the original charge.

9.6.2 In the second class: namely, where the exploding holes have broken away the burden from the hole or holes that failed, it is often necessary to remove part or all of the explosive. This is a dangerous operation at best, and should be undertaken only by a competent and experienced man.

SECTION 10 - CAISSONS, SHAFTS, OR TUNNELS

10.1 In the working chamber of caissons, all electric-light wires shall be provided with the disconnecting switch, which shall be thrown to disconnect all current from the wires in the chamber and the wires removed before explosives are taken into the chamber.

10.2 The blaster shall cause a sufficient warning to be sounded and be responsible that all persons retreat to safe shelter, before he sets off the blast, and shall also see that none return until he reports it safe for them.

10.3 In shaft sinking where electric current is used for firing, a separate circuit shall be used for blasting and proper safeguards followed in order to insure against premature firing. No electrically energized circuit should be run down the same side of the shaft with the blasting circuit.

10.4 No blasts shall be fired with fuse in vertical or steep shafts.

10.5 For tunnel blasting, explosives other than those in Fume Class 1 should not be used unless specifically approved by the Commissioner of Labor or his authorized representative.

10.6 Before loading the round of holes, all electric light or other electrically energized circuits shall be disconnected at a point at least two hundred (200) feet from the working place, leaving no electrically energized wires in the loading areas. Loading should be done by use of approved battery lights.

10.7 All tracks, airlines, vent pipes shall be kept properly grounded.

10.8 Switch arrangement for firing shall conform to the specifications given in rule 6.7, except that the two switches specified shall be placed on opposite sides of the track so that the jumper must be brought across the track to plug into the firing switch.

10.9 The practice of using blasting lines for lighting purposes shall not be tolerated. Also, there shall be no other electrical circuit carried on the same side of the tunnel on which the blasting line is located.

10.10 Explosives shall be removed from the magazine at the last possible moment before loading the round of holes and all unused explosives must be immediately returned to the magazine.

10.11 Dynamite and caps or primers shall be carried to the face in separate insulated containers by separate men. Where primers and dynamite

are transported from the magazines to the face, they shall be taken at separate trips. Where approved by proper state authorities, they may be transported in the same car provided separate insulated compartments are installed with doors opening on opposite sides and a proper insulating coupling pole used.

6-A RF ENERGY HAZARD

1.1 Electric blasting caps shall not be stored in the vicinity of radio broadcasting stations. 2-way radios, television transmitters, FM stations, radar, loran, microwave relays, and high powered amateur transmitters.

1.2 If electric caps are within 300 feet of any 2-way radio transmitter, keep tightly enclosed in all metal can. This can shall consist of a 24-gauge iron box.

1.3 Electric blasting shall not be conducted within the minimum distances shown in the following tables:

ALL TRANSMITTERS EXCEPT FM MOBILE TYPE

Transmitter Power (watts)	Minimum Distance (feet)
5-25	100
25-50	150
50-100	220
100-250	350
250-500	450
500-1,000	650
1,000-2,500	1,000
2,500-5,000	1,500
5,000-10,000	2,500
10,000-25,000	3,500
25,000-50,000	5,000
50,000-100,000	7,000

FM MOBILE TRANSMITTERS

Transmitter Power (watts)	Minimum Distance (feet)
1-10	5
10-30	10
30-60	15
60-250	30

1.4 The minimum firing current of the commercial electric blasting caps now manufactured in this country is about 0.25 ampere. Non-electric initiation should be used if a current testing device shows more than 0.06 ampere,

The most satisfactory testing device is a radio frequency ammeter, If one is not available, however, a pilot lamp which lights up brightly at 0.06 ampere may be substituted. The No. 48 pilot lamp meets this requirement at the present time. (For additional information on method of testing blasting circuits for induced currents, consult "Radio Frequency Energy A Potential Hazard in the Transportation and Use of Electric Blasting Caps" 1956, published by the Institute of Makers of Explosives, 250 E. 43rd St., New York 17, N.Y.)

PART 7

POWDER-ACTUATED TOOLS

SECTION 0 - DEFINITIONS

0.1 EXPLOSIVES: as a noun, means any substance in any form capable of producing an explosion; as an adjective, characterized or operated by, or suited to cause, explosion.

0.2 EXPLOSIVE POWERED TOOL means a production tool or machine which by the application of explosive or equivalent energy propels or discharges an object for the purpose of impinging it upon, affixing it to or penetrating another object or material. The term does not include jet tappers or perforators.

0.3 TOOL means an explosive powered tool unless otherwise indicated, and shall include all barrels, shields and other parts thereof.

SECTION 1 - BASIC REQUIREMENTS

1.1 The muzzle end of the tool shall have a securely attached protective shield not less than three inches in minimum dimension perpendicular to the barrel, designed to confine free flying particles and arrest the ricochet of the projectiles; or, in lieu of such shield, a jig or fixture providing protection equivalent to that afforded by such shield.

1.2 The firing mechanism shall be so designed that the tool will not fire unless the protective shield, jig or fixture is present in its proper position on the muzzle end.

1.3 The firing mechanisms shall be so designed that the tool will not fire due to being dropped from any height.

1.4 Firing of the tool shall be dependent on at least two separate and distinct motions with the muzzle end in firm contact with the surface of the work.

1.5 Protective shields may be retractable for working in recesses or boxes but shall be so designed that when the barrel is removed from a recess the shield shall automatically return to its normal operating position.

1.6 Extension barrels must be equipped with protective shields, jigs or fixtures.

1.7 All safety features shall be durable and shall be so designed that they cannot readily be rendered inoperative and so that they reset after each firing.

1.8 Every tool shall be so designed that it will not operate if the axis of the barrel is inclined more than eight degrees (8) from a position perpendicular to a smooth test surface.

SECTION 2 - OPERATOR REQUIREMENTS

2.1 Every user or operator of a tool must be at least 18 years of age and able to speak and read English, able to use the tool effectively under varying conditions and to disassemble, clean, and reassemble its normally removable parts correctly; able to recognize worn or defective parts or defective operations and to select proper loads, charges and projectiles for the work to be done; and, he must be familiar with the provisions of this rule, and with the regulations and practices recommended by the manufacturer of the tool for its safe use, testing and maintenance. Each user or operator must have in his possession at all times a Qualified Operators Card issued by the tool manufacturers representative stating that the named operator does have the aforementioned qualifications.

2.2 Any agency selling, leasing, or renting powder actuated tools shall, in effecting compliance with Rule 2.1 above, use trained personnel and proper facilities, including tool storage boxes, in giving safety instructions to all renters or buyers. A temporary operators card, limited as to duration and application, shall be issued instead of a permanent operators card, where a tool is rented or where such a card is appropriate for the job to be done.

2.3 No person lacking any of the foregoing qualifications shall use or operate a tool.

2.4 Duty of employers and persons in charge. No person owning or having charge of a tool shall suffer, permit or allow another to use or operate it until and unless he has inquired into the qualifications of such other and has ascertained that this person has in his possession a Qualified Operators Card.

2.5 Training Exemption. The provisions of this article do not apply to the operation and use of tools under the immediate supervision of a competent instructor for the purpose of training operators.

SECTION 3 - MAINTENANCE AND STORAGE OF TOOLS

3.1 Storage Room. Tools not in use shall be left in a storage room or enclosure which shall be kept locked at all times when unattended.

3.2 Care and Storage of Explosives. The supply of the explosive components of all tools shall be kept in such storage rooms or enclosures in locked compartments of incombustible materials. They shall be removed therefrom only as needed for immediate use and delivered to the operator in

suitable metal containers. Unexploded explosive components shall be returned to the locked compartments by the operator in the same containers. At no time shall any unauthorized person handle the explosive components and the operator shall be responsible for all explosives placed in his custody.

3.3 Containers of Tools. Every tool shall be provided with a substantial portable container capable of containing the tool securely and clearly labeled or marked to disclose its contents.

3.4 Use of Container. Every tool shall be kept enclosed in its container at all times when not required to be removed for use or other necessary purpose.

3.5 Safeguarding of Tools. Tools enclosed in their containers shall be delivered from their place of storage to the operators who shall thereupon be responsible for their proper care and use. After being used the tools shall be returned by the operators to the place of storage each complete in its container.

3.6 Meddling. While a tool is in the charge and custody of a designated operator, no other person shall handle or in any way molest it, nor shall such operator cause or permit any other person to handle it or molest it. This provision shall apply also to the container of each tool.

3.7 Instruction Manual. There shall be kept in the container of every tool a copy of this rule and an instruction manual prepared by the manufacturer of the tool showing the purpose for which the tool was manufactured, the method by which the tool may be made safely used, and such other information as the manufacturer may deem necessary or helpful to the operator. Each operator of the tool shall familiarize himself with the contents of both this rule and such manual of instructions and shall keep both available for ready reference at all times when the tool is in use.

SECTION 4 - OPERATION OF TOOLS

4.1 Use for Intended Purpose - No person shall use a tool for any purpose other than that for which it was manufactured.

4.2 Use with Hard and Brittle Material - No person shall knowingly use a tool to force a projectile into or against hardened steel, high tensile steel, cast iron, hard brick, glazed brick or tile, terracotta, marble, granite, slate, glass, or any other extraordinarily hard or brittle material.

4.3 Direct Penetration. Every tool shall be so held that the muzzle shall be in contact with the work surface to be penetrated at the moment of discharge.

4.4 Angle of Discharge - At the moment of discharge the tools must be held so as to cause the projectile to enter the surface to be penetrated as nearly as possible at a perpendicular angle.

4.5 Selection of Load - The operator shall use due care to select the proper cartridge or power plugs, or other means of controlling the force of the explosion so that it develops no more than the necessary pressure to bring about the desired penetration. In doing so he shall be guided as

closely as possible by the manufacturer's specifications. When doubt exists he may make a trial shot to test the surface and the strength of the material to be penetrated, taking all proper precautions to prevent injury to himself or to others nearby.

4.6 Edge Shots. Projectiles shall not be caused to penetrate so close to the edge of brick, concrete, masonry, or wood surface as to create split or cracks.

4.7 Pointing or Holding. No person shall at any time point a tool at another person, nor hold a tool horizontally unless it is necessary to do so in actual use.

4.8 Bystanders. The person in charge of the work on which a tool is used shall take measures to insure that it is used only in such manner and in such places as will not endanger persons who may be in the vicinity.

4.9 No Complete Penetration - No person shall discharge a tool against any object or material which the projectile is normally capable of penetrating completely. This provision shall not apply to objects or materials suitably backed to prevent or contain such penetration.

4.10 Operator to Know Conditions - The operator shall not fire a projectile into a surface unless he is assured to his own satisfaction that there is no person on the opposite side of the surface who will be endangered in case of accidental complete penetration of such surface.

4.11 Flying Projectiles. No person shall knowingly discharge a tool in such a way as to permit the projectile to fly free.

4.12 Muzzle - In manipulating a tool in use the operator shall at all times keep his hands and fingers away from the muzzle.

4.13 Clogging - The muzzle and all parts of the bore and breech shall be kept free from mud, sand, metal particles, or other foreign matter.

4.14 Misfires - In case of a misfire the operator shall hold the tool in operating position for 15 seconds and shall then immediately place and hold it in such position as will cause the projectile to be stopped harmlessly if discharged and remove the cartridge.

4.15 Use in Hazardous Places - No tool shall be used in a location where any flammable or explosives gas or vapor or combustible dust is present in the air in quantity sufficient to produce an explosive or ignitable mixture.

4.16 Eye Protection - No operator shall use a tool unless he is wearing safety goggles or safety glasses of an approved type. Such goggles or glasses shall be provided by the employer.

4.17 Loading - Tools shall be kept unloaded when not in use and no tool shall be loaded except when being prepared for immediate use. Loaded tools shall not be stored or carried from place to place. If the work is interrupted after loading, the tool shall be unloaded at once.

4.18 Pre-Drilled Holes. Projectiles shall not be driven through existing holes in metal or in other materials hard enough to produce deflection, unless a positive guide is used to secure accurate alignment.

4.19 Inspection Before Use - Before beginning to use a tool, the operator shall inspect it and determine to his satisfaction whether the same is in a sound and operable condition. No operator shall use a tool which is not in sound and operable condition and no person shall require him to do so.

4.20 Defect During Use - When a tool develops a defect during use the operator shall immediately cease to use it and shall return it enclosed in its container, to the storage room or to an authorized person and report the defect to his employer.

4.21 Manufacturer's Recommendations - In all respects not specifically mentioned in this rule, the use and operation of every tool, shall be in accordance with the practices recommended therefore by the manufacturer of the tool; but this provision does not require the use of any particular brand or make of explosive components or projectiles.

4.22 In areas where tools are being extensively used, signs and barricades identifying the high hazard area shall be displayed.

SECTION 5 - NON-PROJECTILE TOOLS

5.1 Certain Provisions Not to Apply - The following provisions of this rule do not apply to tools which do not discharge any projectile out of the tool;

Section 1, subdivisions 1.1; 1.3; 1.4; 1.5; 1.6; 1.7.

Section 3, subdivisions 3.3; 3.4; 3.5.

Section 4, subdivisions 4.4; 4.6; 4.10; 4.12; 4.18.

PART 8

COMPRESSED-AIR WORK

SECTION 0 - DEFINITIONS

0.1 CAISSON. The term "caisson" as used in this code shall mean a wood, steel, concrete or reinforced concrete, air- and water-tight chamber in which it is possible for men to work under air pressure greater than atmospheric pressure to excavate material below water level.

0.2 LOCK. The term "lock" shall mean a chamber designed to facilitate the passage of men and materials from an air pressure greater than normal, as in a compartment, tunnel, or caisson, to normal air pressure or vice versa.

0.3 EMERGENCY LOCK. The term "emergency lock" shall mean a lock designed to hold and permit the quick passage of an entire shift.

0.4 MAN LOCK. The term "man lock" shall mean a lock through which only men pass.

0.5 MEDICAL LOCK. The term "medical lock" shall mean a lock to which men suffering from compressed-air disease (the bends) may be removed for medical attention.

0.6 NORMAL AIR PRESSURE. The term "normal air pressure" shall mean the normal atmospheric pressure of 14.7 lb. per square inch at sea level, or 0 lb. per square inch gauge pressure.

0.7 TOTAL PRESSURE. "Total pressure" shall mean normal air pressure plus gauge pressure.

0.8 SHAFT. The term "shaft" shall mean an excavation made from the surface of the ground, the longer axis of which is steeper than forty-five (45) degrees with the horizontal.

0.9 SHAFTING. The term "shafting" shall mean an air- and water-tight enclosure built in the roof of the caisson and extended upward until above the normal ground or water level.

SECTION 1 - GENERAL

1.1 There shall be present at all times at least one competent person representing the contractor, firm, or corporation carrying on the work, and this person shall be familiar with all applicable laws and regulations.

1.2 Every employee shall be properly instructed and shall be required to observe all rules and regulations which concern his safety or the safety of others.

1.3 All machines and parts of machines shall be guarded in accordance with all federal, state, and local rules and regulations relating to machinery.

1.4 No employee shall be permitted to ride on any loaded car, cage, or bucket, or to climb up or down any shaft while any car, cage, or bucket is above him.

1.5 Copies of such sections of the state labor laws or other rules and regulations applicable to the work shall be posted by the person in charge in a conspicuous place at the entrance of each workplace.

SECTION 2 - HOURS OF LABOR

2.1 PRESSURE SHIFTS AND INTERVALS. The working time under compressed air, in any twenty-four (24) hours shall be divided into two (2) shifts with an interval in the open air. The minimum rest interval in open air shall not begin until the employee has reached the open air, persons who have not previously worked in compressed air shall work therein but one shift during the first twenty-four (24) hours. No person shall be subjected to pressure exceeding fifty (50) pounds per square inch except in emergency.

The maximum number of hours to each shift and minimum open-air interval between the shifts during any twenty-four (24) hours for any pressure shall be that set opposite each pressure in columns 3, 4, 5, and 6 in Table 2 on page 68.

2.2 The employer or person in charge shall determine the time of each shift when the pressure is less than eighteen (18) pounds, provided that the total for the two (2) shifts does not exceed eight (8) hours.

SECTION 3 - COMPRESSION

3.1 Every workman going under air pressure for the first time shall be instructed on how to avoid excessive discomfort by continued swallowing, or even moderate blowing, with the nostrils pinched together and the mouth closed. This action tends to increase the freedom with which the air can pass from the nose through the Eustachian tube into the middle ear; thereby facilitating equilibrium of pressure on the inner and outer surfaces of the ear drum.

3.2 When workmen enter the lock, air pressure shall not exceed five (5) pounds gauge pressure during the first minute, and this pressure shall be held constant for an interval long enough to ascertain whether or not any workman is seriously affected.

SECTION 4 - DECOMPRESSION

4.1 No person employed in compressed air shall be permitted to pass from the place in which the work is being done to normal air, except after decompression in the intermediate lock as specified below.

4.1.1 Decompression shall be by the state method, with a drop to one-half (1/2) the maximum gage pressure at the rate of five (5) pounds per minute, and completing decompression at a uniform rate so that the total over-all time of decompression shall be not less than determined from the following prescribed maximum rate:

MAXIMUM GAGE PRESSURE (lb. per sq. in.)	A MAXIMUM AVERAGE RATE OF DECOMPRESSION FROM MAXIMUM GAGE PRESSURE
0-15	3 lb. per minute
15-20	2 lb. per minute
20-30	3 lb. per 2 minutes
30 and over	1 lb. per minute

4.1.2 The time of decompression shall be posted in each man lock on the following form or its equivalent:

TIME OF DECOMPRESSION FOR THIS LOCK

_____ Pounds to _____ pounds in _____ minutes

_____ Pounds to _____ pounds in _____ minutes

This form shall be posted in man lock at all times

Superintendent

4.2 For each eight (8) hour shift, a record of men employed under air pressure shall be kept by a special employee who shall remain outside the lock near the entrance. This record shall show the period each employee spends in the air chamber and the time taken for decompression.

4.3 In no case will persons undergoing decompression resort to instructions as outlined in 3.1 above pertaining to blowing the nose with the nostrils pinched and the mouth closed.

SECTION 5 - GAGES

5.1 When the gage pressure exceeds seventeen (17) pounds to the square inch, a recording gage to show the rate of decompression shall be attached to the exterior of each man lock. The dial shall be of such size that the amount of rise and fall in the air pressure, within any five (5) minute interval, shall be readily shown.

5.2 There shall be on the outer side of each working chamber at least one (1) back pressure gage, which shall at all times be kept accessible and in accurate working order. Additional fittings shall be provided so that these gages may be attached whenever necessary. Back pressure gages shall be tested every twenty-four hours (24) either by dead-weight test, or by an accurate test gage which has itself been tested with a dead weight tester since last used. A record of all tests shall be kept.

5.3 A competent man shall be placed in charge of the valves and gages which regulate and show the pressure in the working chamber. He shall not be employed more than eight (8) hours in any twenty-four. At no time shall he operate more than two (2) separate air lines.

SECTION 6 - LIGHTING

6.1 All lighting in compressed-air chambers shall be by electricity exclusively and two (2) independent electric-lighting systems with independent sources of supply shall be used. The emergency source shall be arranged to become automatically operative on failure of the regularly used source.

6.2 The minimum intensity of light on any walkway, ladder, stair way, or working level shall not be less than one-quarter (1/4) candlepower and in all work places the lighting shall at all times be such as to enable workmen to see their way about clearly.

6.3 All wiring for light and power circuits shall comply with requirements of National Electrical Safety Code in damp or hazardous locations.

6.4 External parts of lighting fixtures and all other electrical equipment when within eight (8) feet of the floor shall be constructed of

noncombustible, nonabsorptive insulating materials, except that metal may be used provided it is effectively grounded.

6.5 Portable lamps shall be equipped with non-combustible, non-absorptive insulating sockets, approved handles, basket guards, and approved cords.

6.6 The use of worn or defective portable and pendent conductors shall be prohibited.

SECTION 7 - EXHAUST VALVES

7.1 Exhaust valves shall be provided, having risers extending to the upper part of chamber, if necessary, and shall be operated at such times as may be required and especially after a blast, and men shall not be required to resume work after a blast until the gas and smoke have cleared.

SECTION 8 - COMMUNICATION AND SIGNAL CODES

8.1 Effective and reliable means of communication such as bells or whistles shall be maintained at all times between the working chamber and the surface, and, whenever possible, telephones shall be installed.

8.2 Any code of signals used shall be kept conspicuously posted near workplace entrance and such other locations as may be necessary to bring them to the attention of all persons concerned.

8.3 In all cases, reply signals, repeating the original signals, shall be made before any cage, skip, bucket, or elevator is placed in motion.

8.4 The minimum size of type used in posted notices shall be not less than one (1) inch in height.

SECTION 9 - SANITATION

9.1 Properly heated, lighted, and ventilated dressing rooms shall be provided for all employees engaged in compressed-air work. Such rooms shall contain metal lockers and benches and be open and accessible to men during the intermission between shifts. Adequate toilet accommodations at the ratio of not less than one (1) for every twenty (20) men employed and one shower bath fitted with regulating valves and one washbasin with stopper shall be provided for each eight men coming off shift. Running water shall also be provided.

9.2 Care shall be taken to keep all parts of caissons and other working compartments, including lockers, dry rooms, rest rooms, and other equipment in a sanitary condition and free from refuse, decaying, or other objectionable matter.

9.3 No nuisance shall be tolerated in the air chamber. Smoking shall be strictly prohibited and all matches and smoking materials shall be left in the locker rooms.

9.4 A separate dryroom shall be provided where working clothes may be dried within a reasonable time. This room shall be well heated.

SECTION 10 - MEDICAL ATTENDANCE AND REGULATIONS

10.1 Any contractor, firm, or corporation carrying on any work in the prosecution of which men are employed or permitted to work in compressed air shall employ at least one (1) duly licensed physician who shall be experienced in compressed air work.

10.2 The contractor shall provide complete facilities, including the issuing of orders or the delegation of authority to the physician, to ensure strict enforcement of the requirements outlined in this section.

10.2.1 A medical lock shall be established and maintained in connection with all work in compressed air when the maximum pressure exceeds seventeen (17) pounds gage pressure. Sure lock shall be not less than five (5) feet in height and shall be provided with a bull's eye and fitted with air valve so arranged as to be operated from within and without. Such lock shall be kept properly heated, lighted, and ventilated and shall contain a gage, a telephone, and cot. Such lock shall be under the complete control of the physician in charge and there shall be maintained in proximity to it a first-aid-room, which shall contain all medical and surgical appliances necessary for first aid in case of accident.

10.2.2 No person shall be permitted to work in compressed air until after he has been examined by the physician and reported to the person in charge to be physically fit to engage in such work.

10.2.3 Every employee absent from work for ten (10) or more consecutive days due to illness or other disability shall be required to pass the regular physical examination before being permitted to return to work.

10.2.4 Every person without previous experience in compressed air shall undergo compression in the medical lock before being permitted to work in any pressure exceeding seventeen (17) pounds gage. During their first day of work, such persons shall not be permitted to work longer than the appropriate period shown in Column 4 in Table 2 herein, without re-examination by the physician in charge.

10.2.5 After a person has been employed continuously in compressed air for a period of two (2) months, he shall be re-examined by the physician and shall not be permitted to work until such re-examination has been made and reported.

10.2.6 The physician shall at all times keep a complete and full record of examinations made by him, which record shall contain dates on which examinations were made and a clear and full description of the person examined, his age, and physical condition at the time examined, and a statement as to the time such person has been engaged in like employment. Records of such examinations shall be kept on file at the place where the work is in progress and shall be subject to inspection by the Commissioner of Labor or his authorized representative.

10.2.7 Every employee shall be furnished with an identification badge carrying at least the following information: (a) That the employee is

a compressed-air worker, (b) The location of the medical lock, (c) That in case of emergency the employee MUST be taken quickly to the medical lock and NOT to a hospital or police station.

TABLE 2. PRESSURE SHIFTS AND INTERVALS OF WORK FOR EACH TWENTY-FOUR HOUR PERIOD. The total number of hours a man works under any pressure in any twenty-four (24) hour period shall be that shown in Column 3

1		2		3	4		5	6
MIN. LB. COMPRESSED		MAX. LB. COMPRESSED		PER. MAX. TOTAL	1 ST SHIFT COMPRESSED		MAX. HRS. REST INTERVAL IN	MAX.
PER. SQ. IN.	SQ. IN.	SQ. IN.	SQ. IN.	HOURS	AIR	OPEN AIR	AIR	2 ND SHIFT AIR
Normal		18		8	4	½		4
18		26		6	3	1		3
26		33		4	2	2		2
33		38		3	1 ½	3		1 ½
38		43		2	1	4		1
43		48		1 ½	¾	5		¾
48		50		1	½	6		½

10.2.8 Every medical lock shall at all times have a physician or other responsible person in attendance. When the physician is absent, the person in charge shall have positive means of promptly communicating with and securing the services of a competent physician in case of emergency.

10.2.9 When the air pressure exceeds seventeen (17) pounds gage pressure or when fifty (50) or more men are employed, a physician shall be in attendance at all times while work is in progress.

10.2.10 All cases of compressed-air illness shall be reported on a uniform blank and copies of all such reports shall be kept on file at the place where the work is in progress.

10.2.11 No person known to be addicted to the excessive use of intoxicants shall be permitted to work in compressed air.

SECTION 11 - INTOXICATING LIQUOR PROHIBITED

11.1 No person under the influence of intoxicating liquor shall be permitted to enter any shaft, caisson, workplace, or storage place connected with the project, nor shall intoxicating liquor be brought into such places. This shall not prevent the carrying of alcoholic spirits or other stimulants into such caissons or buildings for medical purposes in accordance with law.

SECTION 12 - TEMPERATURE AND VENTILATION

12.1 The temperature of all working chambers which are subject to air pressure shall, by means of after-coolers or other suitable devices, be maintained at a temperature not to exceed 85° F.

12.2 The supply of fresh air to the working chamber shall at all times be sufficient to permit work to be done without danger or excessive discomfort. All air supply lines shall be supplied with check valves and carried as near to the face as practicable.

12.3 The air in the workplace shall be analyzed by the contractor not less than once each day and records of such tests shall be kept on file at the place where the work is in progress.

SECTION 13 - COMPRESSOR PLANTS

13.1 A good and sufficient air plant for the compression of air shall be provided to meet all emergencies in addition to all ordinary requirements. Provision shall be made for storing in tanks at each boiler house enough feed water for twelve (12) hours' supply, unless connections are made with two independent and separately sufficient sources of water supply.

13.2 The compressor plant shall be capable of furnishing to each working chamber an air supply great enough to keep workplaces in the driest condition possible.

13.3 When electric power is used for running compressors supplying air for compressed air tunnel work, and such power is purchased from, or supplied by a local central station or power company, the specifications given in this section shall be met.

13.3.1 There shall be not less than two (2) supply lines from the central stations to the compressor plant. Such power feeders should each have a capacity large enough to carry the entire compressor plant load and normal over-load. The feeders should preferably run from separate generating plants or sub-stations and be carried to the compressor plant over distinctly separate routes so that the breakdown of one feeder shall not cause any interruption on the other feeder.

13.3.2 There shall be duplicate feeder bus-bars and feeder connections to the bus-bars, so arranged that either feeder can feed each individual bus-bar set separately or simultaneously.

13.3.3 There shall be at least two (2) compressors so connected to the bus-bars that they can be operated from either set of busses. The compressors should be fed from different bus-bar sets, in such way that a breakdown of a feeder or bus-bar would interrupt the operation of only part of the compressor plant.

13.3.4 There shall be duplicate air-fed pipes from the compressor plant to a point inside the tunnel or caisson and well beyond the air lock.

SECTION 14 - LOCKS AND SHAFTS

14.1 Locks, reducers, and shafting used in connection with caissons shall be of riveted construction throughout. The material used in their manufacture shall not be less than one-quarter (1/4)inch steel plate.

14.2 Shafts shall be subjected to a hydrostatic or air-pressure test of seventy-five (75) pounds per square inch at which pressure they shall be tight and stamped on the outside shell about twelve (12) inches from each flange to show the pressure to which they have been subjected.

14.3 Whenever a shaft is used, it shall be provided, where space permits, with a safe, proper, and suitable staircase for its entire length including landing platforms not more than twenty (20) feet apart. Where this is impracticable, suitable ladders shall be installed with landing platforms located about twenty (20) feet apart to break the climb.

14.4 All shafting used in pneumatic caissons shall be provided with ladders which shall be kept clear and in good condition at all times. All ladders shall be constructed, inspected, and maintained in strict accordance with Part 10 of this code.

14.5 All necessary instruments shall be attached to all caissons and air locks showing the actual air pressure to which men employed therein are subjected. This shall include pressure gages, timepieces, and thermometers all of which shall be accessible to and in charge of a competent person.

14.6 All outside caisson air locks shall be provided with a platform not less than forty-two (42) inches wide and provided with a guardrail forty-two (42) inches high.

14.7 All caissons having a diameter or side greater than ten (10) feet long shall be provided with a man lock and shaft for the exclusive use of workmen. Each lock shall be equipped with a timepiece, gage, and valves which can be operated from both inside and outside the lock. The temperature in such locks and shafts shall not be permitted to drop below 70° F.

14.8 All caissons in which fifteen (15) or more men are employed shall have two (2) locks, one of which shall be used as a man lock. Man locks and shafts shall be in charge of men whose duty it shall be to operate the air valves in such locks.

14.9 Locks should be so located that the lowest part of the bottom door shall be not less than three (3) feet above mean high water level.

14.10 In addition to the gage in the locks, an accurate gage shall be maintained on the outer and inner side of each bulkhead. These gages shall be accessible at all times and kept in accurate working order.

SECTION 15 - SAFETY SHIELDS

15.1 Wherever, in the prosecution of caisson work in which compressed air is used, the working chamber is less than twelve (12) feet in length, and when such caissons are at any time suspended or hung while work is in progress, so that the bottom of the excavation is more than nine (9)

feet below the deck of the working chamber, a shield shall be erected therein for the protection of the workmen.

SECTION 16 - SINKING CAISSONS

16.1 Caissons shall not, at any one time, be dropped a greater depth than twenty-four (24) inches, by the method of removing the air pressure therein, and then only by the person in charge.

16.2 Caissons shall be properly and adequately braced before they are loaded with concrete or other weights.

16.3 Pig iron and other weights for sinking caissons shall be piled in an orderly and safe manner and the weights provided with rings for ease in handling.

SECTION 17 - FIRE PROTECTION

17.1 Head frames shall be constructed of structural steel or open frame work fireproofed timber. Head houses and other temporary surface buildings or structures within one hundred (100) feet of the shaft, caisson, or tunnel opening shall be built of fire-resisting materials.

17.2 No oil, gasoline, or other combustible material shall be stored within one hundred (100) feet of any shaft, caisson, or tunnel opening, except that oils may be stored in suitable tanks in isolated fireproof buildings, provided such buildings are not less than fifty (50) feet from any shaft, caisson, or tunnel opening or any building directly connected thereto.

17.3 Positive means shall be taken to prevent leaking flammable liquids from flowing into the areas specifically mentioned in the preceding paragraph.

17.4 Where feasible, a fire hose connected to a suitable source of water shall be provided at the top of every caisson. Where fire mains are not accessible, a supply of water may be stored in tanks near the top of each caisson, provided fire pails or suitable pumps are kept available, or approved fire extinguishers may be substituted.

17.5 On both sides of every tunnel bulkhead a fire hose long enough to reach half way to the adjacent bulkhead shall be connected to a suitable water supply. Where water lines are provided with intermediate hose connections, the length of each hose shall be such that water can be readily directed on any part of the tunnel. In the event that water under pressure is not available, buckets of sand and approved fire extinguishers may be substituted.

SECTION 18 - EXPLOSIVES

18.1 All explosives used in connection with compressed-air work shall be selected, stored, transported, and used as specified in PART 6, "Blasting" of this code.

PART 9

DERRICKS AND CRANES

SECTION 1 - GENERAL

1.1 All derricks and cranes shall be so constructed, erected, maintained, and used that no part shall be stressed beyond its safe working strength. All applicable laws, rules or regulations, and local ordinances shall be complied with at all times.

1.1a Any boom or extension to a boom, designed by other than a recognized manufacturer or structural engineer, shall be tested before use, and at any other time requested by the Commissioner of Labor or his authorized representative, with a vertical load at least twenty-five (25%) greater than the load which it is intended to lift, and with a lateral load equal to one-half (1/2) the load it is intended to lift vertically.

1.2 All wire ropes shall be inspected before being used and any rope showing excessive rust or breakage of ten (10) per cent or more of the number of wires in any three (3) foot length of the rope shall not be used.

1.3 Before erection, all blocks, shackles, sheaves, and the top connection on the mast of all guy derricks shall be thoroughly inspected.

1.4 Every derrick shall be inspected daily by a competent man and a record of all inspections shall be kept at the scene of the operations until completion of the job.

1.5 All chains, ropes, and blocks shall be of sufficient strength, condition, and size to safely raise, lower, or sustain the imposed load in any position. Ropes shall be securely attached to drums and so arranged as to insure proper winding.

1.6 For information concerning the use of iacks, see PART 2, Section 4.

1.7 The foot block of every derrick shall be solidly supported and firmly secured against movement in any direction. Shores shall be placed against the foot blocks of the derrick to prevent any horizontal movement.

1.8 Derricks and cranes shall always be in charge of skilled operators and no derrick shall be operated by other persons.

1.9 The top of the mast on guy derricks shall be steadied by not less than six (6) guy cables spaced so as to make the angles between adjacent cables approximately equal.

1.10 Care shall be taken to prevent contact of any part of the derrick, guy cables, or load with electric wires.

1.11 Where "dead men" are used as anchors, the cable shall be so attached that the allowable unit shearing stress of the material of which the dead men are made will not be exceeded.

1.12 On stiff-leg derricks where the boom is longer than the mast, goose-necks shall be firmly secured and fitted to the stiff legs so that there will be no excessive friction on the gudgeon pin.

1.13 Above the top goose-neck a collar shall be placed on the gudgeon pin to which the collar shall be securely fastened by means of a steel bolt or other approved method. If a steel bolt is used, it shall be strong enough to withstand any shearing load from a goose-neck in the event that a still leg is struck by the boom. In addition, a vertical hold-down guy should be used from the goose-neck to the foot-block.

1.14 The weighting and anchoring of every stiff-leg derrick shall be such as to ensure stability of the derrick.

1.15 On guy derricks, eyes shall be formed in the guys at the masthead end by bending back and clamping the end of each cable with at least three (3) U clamps and thimbles shall be placed in these eyes to prevent chafing the cables. The guys shall be secured to the guy or spider plates by means of shackles and each shackle pin shall be held in place by means of a cotter pin. Properly attached socket fittings may be used in lieu of the thimbles and rope clamps.

1.16 A tag line or guide rope shall be used on all loads that swing freely and every tag line shall be controlled by an experienced man.

1.17 Loads, load lines, and booms shall not be permitted to against scaffolds, objects, or structures.

1.18 Workmen shall not be allowed to ride on loads handled by derricks or cranes.

1.19 Loads shall not be lifted or swung over the heads of persons and no one shall be permitted to walk under a load.

1.20 When work is stopped or when the derrick is not in operation, the boom shall be lowered to a horizontal position or tied in place to prevent wind forces from blowing it out of control.

1.21 Sling hitches on loads shall be made by, or under the supervision of, experienced men.

SECTION 2 - SIGNAL SYSTEMS FOR DERRICKS AND CRANES

2.1 Signals to crane and derrick operators shall be in accordance with rules 2.2, 2.3, or 2.4 in this section except that whistle signals shall not be used when such signals would cause confusion in the operation of other derricks and cranes in the same general vicinity. A copy of the signals in use shall be posted in a conspicuous place on or near each derrick or crane.

2.2 Signals given by one hand shall be as follows: (1) HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle. (2) LOWER. Arm extended, palm down, wave hand down and up. (3)

STOP. Arm extended, palm down, hold position rigidly. (4) EMERGENCY STOP. Same as (3), but move hand rapidly right and left. (5) RAISE BOOM. Arm extended, fingers closed, thumb pointing upward, move hand up and down. (6) LOWER BOOM. Same as (5), but with thumb pointing down. (7) SWING BOOM. Arm extended, point with finger in direction of motion.

2.3 Signals given by both hands shall be as follows: (8) HOIST. Hold both arms horizontal at sides, fully extended, and move upward and return. (9) LOWER. Hold both arms at sides, fully extended, and move out and return. (10) STOP. Hold both arms horizontal at sides, fully extended. Same as (8) without motion. (11) MOVE SLOWLY. Same as (1) or (2), but with other hand held near (behind or below) the hand giving the signal. (12) RAISE BOOM AND LOWER LOAD. Use (5) and (2) together. (13) LOWER BOOM AND RAISE LOAD. Use (6) and (1) together. (14) DOG OFF LOAD AND BOOM. Clasp fingers of one hand with fingers of other, palms facing each other.

2.4 Signals given by whistle shall be as follows: (15) HOIST. Two short blasts. (16) LOWER. Three short blasts. (17) STOP. One short blast. (18) EMERGENCY STOP. Series of short blasts. (19) RAISE BOOM. Four short blasts. (20) LOWER BOOM. Five short blasts. (21) STOP BOOM. One short blast.

2.5 An electrical signal system, utilizing electrically-operated bells or lights may be used.

SECTION 3 - BREAST DERRICKS

3.1 Breast derricks used for setting stone shall be set on heavy planks--never directly on newly-laid floor arches.

3.2 Where a breast derrick cannot be guyed from the front or load side, a strut or stiff triangular brace shall be fastened to the back of the derrick to prevent it from falling backwards.

3.3 All gears shall be effectively guarded and a ratchet and pawl which will hold the load at any desired height provided.

3.4 A hole shall be drilled in each end of the gear shaft outside the operating lever, and a cotter pin placed in each hole to prevent the handle from slipping or working off the shaft.

3.5 Mechanical brakes which will hold one hundred fifty (150) percent of the rate load shall be provided and their efficiency maintained.

3.6 Crank handles shall be removed from the crankshaft before any load is lowered by means of the brake and they shall be kept removed as long as the brake is being used.

SECTION 4 - PIPE-LAYING DERRICKS

4.1 Blocks, hooks, slings, brakes, ropes, or chains shall be inspected at the start of every day's work.

4.2 The winding drum shall be equipped with a friction brake and positive pawl.

4.3 All gear wheels and blocks shall be effectively guarded.

4.4 At night the rope or cable shall be wound up until the blocks meet, and the drums shall be chained and locked.

4.5 When motor truck and caterpillar derricks are used, positive means shall be taken to prevent the load from overturning the supporting vehicle.

SECTION 5 - GIN POLES

5.1 Gin poles shall be properly guyed according to the type used.

5.2 Guys shall be attached to "dead men" other approved type anchors or to some permanent stable structure.

5.3 When guy lines are anchored to a permanent structure the anchors shall be located at least one-half (1/2) the height of the pole from its base, and when "dead men" are used, the distance from the base shall be at least one and one-half (1 1/2) times the height of the pole.

5.4 Every gin pole shall be securely fastened at the bottom to prevent it from kicking out during operation.

5.5 Gin poles shall be of selected timber, sound, and free from knots or other injurious defects, or of steel pipe of equivalent strength.

5.6 Allowable loads for spruce timbers used as gin poles shall not exceed those specified hereunder. (see chart on below)

ALLOWABLE LOADS FOR SPRUCE TIMBERS AS GIN POLES

<u>ACTUAL SIZE</u> (Inches)	<u>LENGTH</u> (Feet)	<u>ALLOWABLE LOAD CAPACITY</u> (Tons)
6 x 6	10	10.4
6 x 6	15	6.6
6 x 6	20	3.7
6 x 6	25 Max.	2.4
8 x 8	20	11.7
8 x 8	25	7.5
8 x 8	30	5.2
8 x 8	33' 4" Max.	4.2
10 x 10	25	18.2
10 x 10	30	12.7
10 x 10	35	9.3
10 x 10	41' 8" Max.	6.6
12 x 12	30	26.3
12 x 12	35	19.3
12 x 12	40	14.8
12 x 12	45	11.7
12 x 12	50 Max.	9.5

NOTE: The allowable loads and the limiting lengths given are based on the U.S. Forest Products Laboratory Standard Recommendations for Spruce of Common Grade, based on pin-connected ends for columns.

5.7 When wood gin poles are spliced to increase their length, the splice shall be made with heavy planking at least four (4) feet long securely bolted to all four (4) sides of the pole. If splicing planks are spiked, they shall be securely lashed at the same points.

5.8 In addition to the guy lines at the top of the pole, at least three (3) guy lines shall be attached at the point of the splice in the case of a wood gin pole.

SECTION 6 - SLINGS

6.1 Hoisting equipment shall always include slings or other lifting devices and shall be kept in good condition.

6.2 The ends of slings made of wire or fiber rope shall be properly spliced to form the loops.

6.3 Wire rope slings shall be frequently inspected and lubricated.

6.4 Blocks or heavy padding should be used at corners of the load to protect the sling from sharp bending.

6.5 When a multiple sling is used to lift a load, the sling shall be so arranged that the stress will be equalized between the ropes.

6.6 When using a sling with both ends engaged in the hoisting block, the sling shall be adjusted so as to equalize the stress.

SECTION 7 - HOOKS

7.1 All hooks shall be of forged steel or built-up steel plates and no hook shall be used for purposes for which it was not designed.

7.2 Hooks which have become bent or worn more than twenty (20) percent at a critical section shall be discarded.

7.3 Safety-type hooks shall be used wherever possible. Where frequent hooking and unhooking are not necessary, open-type hooks may be used, provided wire mousings are used to prevent loads from being intentionally unhooked.

SECTION 8 - SHEAVES

8.1 Cast-iron sheaves shall not be used when cast steel sheaves are obtainable. Where used, cast-iron sheaves shall be frequently tested for cracks and defects by an approved method.

8.2 Sheaves which have become worn, chipped, or the grooves corrugated shall not be used.

8.3 Sheaves and idlers shall be provided with guards to keep the cable on if it becomes slack.

8.4 Sheaves and blocks designed for use with Manila rope shall not be used for wire rope.

8.5 All blocks less than seven (7) feet above any floor or walkway level shall be well guarded.

8.6 A gate block shall be closed and hooked before being used.

8.7 Sheaves and drums shall be kept in proper alignment to avoid excessive wear of the sheaves and ropes.

SECTION 9 - MANILA ROPES

9.1 Only the best obtainable grade of Manila rope shall be used and each size and kind of rope shall be used and maintained in strict accordance with the recommendations of the manufacturer.

9.2 Whenever rope has become wet and dirty it shall be cleaned and hung up or laid in a loose coil so it can properly dry out. At no time shall Manila rope be allowed to come in contact with steam pipes or open fires.

9.3 Rope shall be stored on racks or platforms fully protected from moisture and extremes in temperature.

9.4 Precautions shall be taken to prevent wet fiber rope from freezing. If it does become frozen, it shall be immediately removed from service and hung up in a warm dry location having good air circulation.

9.5 No fiber rope shall ever be loaded or stressed when it is kinked and as far as possible kinking shall be prevented even when it is not stressed.

9.6 Rope shall never be exposed to lime or acids nor stored in a room containing acids.

9.7 Rope should never be dragged along the ground or over rough or dirty surfaces.

9.8 Rope shall not be made fast to sharp objects, and sharp bends which cause excessive stresses in the fibers shall be avoided.

9.9 All blocks shall be in good condition and blocks whose grooves are so small as to cause abrasion in the rope shall not be used.

9.10 Blocks built for wire rope shall not be used for Manila rope.

9.11 Rope shall be inspected frequently and especially before being placed in storage, if it has been subjected to severe usage.

SECTION 10 - WIRE ROPE

10.1 Every wire rope shall be used and maintained in strict accordance with the recommendations of the manufacturer, for working load. A factor of safety of not less than five (5) is recommended at all times.

10.2 Wire hoisting ropes shall be carefully inspected at least once a day when in use by a competent man, and a signed record of his inspections shall be kept on file at the scene of operations.

10.3 Kinking and untwisting of the wire rope shall be carefully avoided; at no time shall a load be applied to a kinked rope.

10.4 Wire rope shall be lubricated and a lubricant recommended by a wire rope manufacturer should be used.

10.5 Wire rope shall be securely fastened to drums by zinc plugs or other approved means and at least two (2) full turns of the rope shall remain on the winding drum at all times except when the drums are being re-cabled.

10.6 Wire rope shall be wound evenly on the drum and not allowed to lap one layer on another in an irregular fashion. Where feasible, a guide pulley shall be used to guide the rope properly on the drum.

10.7 Wherever necessary, wire ropes shall be guarded to prevent persons or material coming in contact with them.

10.8 Friction of wire ropes with other objects which will cause chafing or breaking of wires shall be prevented.

10.9 In attaching U type cable clamps, the closed or curved end of the U shall always be placed in contact with the short or dead end of the cable and thimbles should be used whenever necessary in all cable eyes. The nuts on U clamps shall be inspected and tightened up frequently during operations.

SECTION 11 - CHAINS

11.1 All hoisting chains shall be thoroughly inspected at least once each month when in use by a qualified inspector. A signed record of all inspections shall be kept on file at the scene of operations.

11.2 When new, chains should be calipered for length in sections of one (1) to three (3) feet [preferably five (5) links]. The record thus obtained shall be compared with the corresponding measurements obtained during future inspections. When the increase in length of any section exceeds five (5) percent the chain shall be removed from service for reconditioning or junking.

11.3 Chains shall not be shortened or spliced by placing nails or bolts between two (2) links nor shall chains be knotted.

11.4 No chain shall be subjected to any load in excess of the safe load specified by the chain manufacturer.

11.5 Defective links or portions of the chain shall be replaced only by links or sections furnished by the manufacturer for the particular chain involved. Such repairs shall be made only by a qualified man and, wherever feasible, chains shall be returned to the manufacturer for repairs.

11.6 A complete record should be kept for every chain. The record should include date of installation and all repair, annealing, or normalizing and inspection dates. Every chain shall be identified by suitably marked metal tags or flat links. No punch marks or nicks shall be made on any load-carrying part of a chain since such nicks become points of stress concentration and possibly ultimate failure.

11.7 When in constant use, steel chains should be normalized and iron chains annealed at intervals not to exceed six months. The annealing or normalizing shall be done by the manufacturer or in strict accordance with his recommendations.

PART 10

SCAFFOLDS

SECTION 0 - DEFINITIONS

0.1 SCAFFOLD. The term "scaffold" shall mean any temporarily located elevated platform used for supporting workmen or materials in the course of any and all types of construction work including maintenance and demolition.

0.2 SINGLE POLE SCAFFOLD. The term "single pole scaffold" shall mean a platform resting on putlogs or crossbeams, the outer ends of which are supported on ledgers secured to a single row of posts or uprights and the inner ends on a wall or holes in a wall.

0.3 INDEPENDENT POLE SCAFFOLD. The term "independent pole scaffold" shall mean a scaffold supported from the base by a double row of uprights, independent of support from the walls and constructed of uprights, ledgers, horizontal platform bearers, and diagonal bracing. An independent pole scaffold may also be referred to as a built-up scaffold.

0.4 SUSPENDED SCAFFOLD. The term "suspended scaffold" shall mean a scaffold supported from above, the platform of which is supported at more than two (2) points by steel wire cables suspended from overhead outriggers which are anchored to the steel or concrete frame of the building. It is equipped with a hoisting drum or machine so the platform can be raised or lowered.

0.5 SWINGING SCAFFOLD. The term "swinging scaffold" shall mean a scaffold, the platform of which is supported by stirrups or hangers at not more than two (2) points suspended from overhead supports in a manner to permit raising or lowering to suit required position.

0.6 OUTRIGGER SCAFFOLD. The term "outrigger scaffold" shall mean a scaffold, the platform of which is supported by outriggers or thrust outs projecting from the wall of the building, the inner end of which is secured inside the building.

0.7 CARPENTERS' BRACKET SCAFFOLD. The term "carpenters" bracket scaffold" shall mean a scaffold, the platform of which is composed of planks and supported on triangular braced brackets secured to the side of the building.

0.8 BRICKLAYERS' SQUARE SCAFFOLD. The term "bricklayers' square scaffold" shall mean a scaffold, the platform of which is composed of planks supported on built-up squares secured to each other by diagonal bracing.

0.9 SQUARE. The term "square" shall mean a framed structure built up of vertical and horizontal members and braces, which when used in pairs and set up and braced longitudinally, provides a support for a working platform.

0.10 NEEDLE BEAM SCAFFOLD. The term "needle beam scaffold" shall mean a scaffold consisting of a plank platform resting on two parallel horizontal beams called "needle beams" supported by ropes.

0.11 HORSE SCAFFOLD. The term "horse scaffold" shall mean a scaffold, the platform of which is supported by horses.

0.12 PLASTERERS INSIDE SCAFFOLD. The term "plasterers inside scaffold" shall mean a scaffold constructed for light work inside of a building, the platform of which is supported by trestle ladders, or a light pole scaffold.

0.13 LADDER JACK SCAFFOLD. The term "ladder jack scaffold" shall mean a scaffold, the platform of which is supported by jacks attached to ladders .

0.14 WINDOW JACK SCAFFOLD. The term "window jack scaffold" shall mean a scaffold, the platform of which is supported by a jack or thrust out which projects through a window opening.

0.15 ROOFING BRACKET. The term "roofing bracket" shall mean a bracket used for shingling or roofing having sharp points that are driven into the roof to prevent slipping and supported by means of ropes passing over the ridge and secured to some permanent object on the further side of the roof or with hooks over the ridgepole.

0.16 CRAWLING BOARD OR CHICKEN LADDER. The term "crawling board" or "chicken ladder" shall mean a single plank or board to which cross strips or cleats are nailed at equal intervals for carwling up or down steep inclines.

0.17 BOATSWAIN'S CHAIR. The term "boatswain's chair" shall mean a seat to support a workman in a sitting position, supported by rope slings attached to suspension rope.

0.18 PUTLOG OR BEARER. The term "putlog" or "bearer" shall mean a scaffold member, upon which the platform rests. In a single pole scaffold the outer end of the putlog rests on a ledger and the inner end rests in the wall. In an independent pole scaffold each end of the putlog rests on a ledger. In an independent pole scaffold a putlog is known as a bearer.

0.19 LEDGER AND STRINGER. The term "ledger" and "stringer" shall mean a scaffold member which extends horizontally from post to post, at right

angles to the putlogs, supports the putlogs, forms a tie between the posts, and becomes a part of the scaffold bracing. Ledgers which do not support putlogs are called stringers.

0.20 BRACE. The term "brace" shall mean a tie that holds one point in a fixed position with respect to another point. Bracing is a system of braces or ties that prevent distortion of a structure.

0.21 GUARDRAIL. The term "guardrail" shall mean a horizontal rail secured to uprights and erected along the exposed edges of scaffolds, floor openings, wall openings, runways, etc., to prevent persons from falling.

0.22 TOE BOARD. The term "toe board" shall mean a barrier placed along the edge of a scaffold platform, runway, etc., and secured thereto to guard against the falling of material.

0.23 FLOAT, OR SHIP, SCAFFOLD. The terms "float scaffold" or "ship scaffold" shall mean a scaffold hung from an overhead support by means of ropes, and consisting of a platform of planks fastened together by a diagonal board underneath the platform, and resting upon and securely fastened to two (2) parallel plank bearers at right angle to the span.

0.24 SECTION METAL SCAFFOLDS. The term "sectional metal scaffolds" shall mean scaffolds of three (3) types -- light-duty, medium-duty and heavy-duty-- each type shall be constructed of minimum structural sections as per Section 21 of this code.

SECTION 1 - GENERAL REQUIREMENTS FOR ALL SCAFFOLDS

1.1 Scaffolds constructed in accordance with this code shall be provided for workmen engaged in work that cannot be done safely from the ground or from solid construction, except such short-period work as can be done safely from ladders.

1.2 Any person employing or directing another to perform labor of any kind in any and all kinds of construction operations, including maintenance and demolition, shall furnish and erect, or cause to be furnished and erected, such scaffolding, hoists, stays, ladders, slings, hangers, blocks, pulleys, braces, irons, ropes, and other mechanical contrivances as may be necessary for the safety of the persons employed.

1.3 Scaffolding or staging more than eight (8) feet above the ground or floor, swung or suspended from an overhead support or erected with stationary supports (except scaffolding wholly within the interior of a building and covering the entire floor space of any room or stairwell), shall have a safety or guardrail properly attached, bolted, braced, and other wise secured, at least thirty-six (36) and not more than forty-two (42) inches high above the floor or platforms of such, scaffolding or staging, and extending along the entire length of the outside and the ends thereof, with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

1.4 All scaffolds and their supports shall be capable of supporting the load they are designed to carry with a safety factor of at least four (4).

1.5 All scaffolds and other devices mentioned or described herein shall be maintained in a safe condition and no scaffold shall be altered or removed while it is in use.

1.6 Any scaffold damaged or weakened from any cause shall be immediately repaired and workmen shall not be allowed to use it until repairs have been completed.

1.7 No scaffold shall be used for the storage of material except that being currently used and at no time shall any scaffold be overloaded.

1.8 All lumber used in the construction of scaffolds shall be spruce, fir, yellow pine, No. 2 Southern pine, or material of equal strength. Hemlock or short fiber lumber shall not be used.

1.9 All lumber used in the construction of scaffolds shall be sound, straight-grained, free from crossgrain, shakes, and large, loose or dead knots. It shall also be free from dry rot, large checks, worm holes, or other defects impairing its strength or durability.

1.10 All platform planks shall be not less than two (2") inches in thickness and ten (10") inches in width or material of equal strength except for needle beam scaffolds, planks shall overlap bearers not less than six (6") inches nor more than eighteen (18") inches or they shall be fastened in place.

1.11 The minimum width of every planked platform shall be twenty (20) inches.

1.12 All nails used in the construction of scaffolds, staging, and supports shall be of ample size and length and used in sufficient quantities at each connection to develop the designed strength of the scaffold.

1.13 No nail shall be subjected to a straight pull in any scaffold and all nails shall be driven in full length, except that this shall not prohibit the proper use of double-headed nails.

1.14 When taking down scaffolds, all nails should be immediately withdrawn from the lumber.

1.15 Barrels, boxes, loose tile blocks, loose piles of bricks, or other unstable objects shall not be used as scaffolding or for the support of planking intended as scaffolds or working platforms.

1.16 The poles of scaffolds shall be securely and rigidly braced to prevent swaying and displacement.

1.17 When materials are being hoisted up on a scaffold they shall have a tag line to prevent them striking against the scaffold unless hoisting equipment is arranged so that there is no danger of material striking scaffold.

1.18 When men are working on a scaffold with other men engaged above, the scaffold shall have an overhead covering of planking as a protection to the men working thereon.

1.19 When it is necessary for workmen to work or pass under a scaffold upon which other men are working, there shall be a screen or other protection suspended from the scaffold to catch material that may fall from above. Screens shall extend a sufficient distance beyond the edge of the scaffold to catch any material that may fall over the edges. The netting of such a screen shall be not less than No. 18 gage U.S. Standard Wire with a mesh not to exceed one-half (1/2) inch. Screens of heavier wire and smaller mesh shall be used where conditions are such that No. 18 gage wire or one-half (1/2) inch mesh will not furnish adequate protection to persons below the scaffold.

1.20 Side screens shall be provided on scaffolds erected in places adjacent to passageways or thoroughfares to guard against falling material.

1.21 Men shall not be permitted to work on a scaffold during a storm or high wind.

1.22 Scaffolds shall be cleared of all tools and rubbish at the end of each working day.

1.23 Men shall not be permitted on scaffolds which are covered with ice or snow. Clinging ice should be removed from all guardrails and uprights, and the planking sanded to prevent slipping.

1.24 When cleaning down buildings from scaffolds, acid shall be kept from coming in contact with rope, and the fall line shall be kept on the outside of the scaffold with the free end coiled in a box or barrel located so the rope will slope away from the building.

1.25 Rope which has been in contact with acid shall be immediately removed and destroyed.

1.26 When acid solutions are used for cleaning down buildings over fifty (50) feet in height, steel wire cables shall be used.

1.27 The use of shore scaffolds or lean-to scaffolds is prohibited.

1.28 Lumber sizes, when used in this code, refer to nominal sizes except where dimensions other than standard sizes are given.

SECTION 2 - SINGLE POLE OR BRICKLAYERS' POLE SCAFFOLDS

2.1 Single pole scaffolds shall be classified as either "light duty" scaffolds or "heavy duty" scaffolds.

2.2 "Light duty" scaffold shall mean a scaffold designed and constructed to carry a working load of twenty-five (25) pounds per square foot, such as intended for the use of carpenters, painters, or other similar trades, and which supports no load other than the workmen and a minimum amount of light-weight material.

2.3 "Heavy duty" scaffold shall mean a scaffold designed and constructed to carry a working load of seventy-five (75) pounds per square foot, such as intended for the use of stone masons or others of similar trades, and which supports in addition to the workmen a supply of building material.

2.4 For "light duty" scaffolds not more than twenty-four (24) feet in height the following minimum nominal size material is recommended:

Poles or uprights	2 x 4 in.
Ledgers--supporting putlogs	2 x 6 in.
Stringers, not supporting putlogs	1 x 6 in.
Putlogs	4 x 4 in. or 2 x 6 in. on edge
Braces	1 x 4 in.
Spacing of poles--measured along platform, not to exceed	7 ft. 6 in.
Spacing of poles--distance from building not to exceed	5 ft. 0 in.
Spacing of ledgers--vertically	7 ft. 0 in.
Planking	2 x 10 in.
Toe Boards	1 x 6 in.
Guardrails	2 x 4 in.

2.5 For scaffolds more than twenty-four (24) feet in height and not more than forty (40) feet in height, the poles shall be three by four (3 x 4) inches in cross section, and for scaffolds more than forty (40) feet in height, four by four (4 x 4) inches in cross section or heavier as required. Other members shall conform with the requirements of paragraph 2.4 above.

2.6 For "heavy duty" scaffolds not more than twenty-four (24) feet in height the following minimum nominal size material is recommended:

Poles or uprights	3 x 4 in. or 2 x 6 in.
Ledgers--supporting putlogs	2 x 8 in.
Stringers--not supporting putlogs	1 x 6 in.
Putlogs	4 x 4 in. or 2 x 8 in. on edge
Braces	1 x 6 in.
Spacing of poles--distance between poles, not to exceed	7 ft. 0 in.
Spacing of poles--distance from building, not to exceed	5 ft. 0 in.
Spacing of ledgers--vertically	4 ft. 6 in.
Planking	2 x 10 in.
Toe Boards	2 x 6 in.
Guardrails	2 x 4 in.

2.7 For scaffolds more than twenty-four (24) feet in height and not more than forty (40) feet in height, the poles shall be four by four (4 x 4) inches in cross section, and for scaffolds more than forty (40) feet in height four by six (4 x 6) inches in cross section or heavier as required. Other members shall conform with the requirements of paragraph 2.6.

2.8 Where single pole scaffolds are used for very light work, the width of the platform (distance of poles from building) may be reduced to a width consistent with the nature of the work and the safety of the men working thereon, but in no instance shall the scaffold be less than two (2) planks in width. See Section 4, rules 4.27, 4.28, 4.29 and 4.30 for the use of spring stay braces.

SECTION 3 - INDEPENDENT POLE OR BUILT-UP SCAFFOLDS

3.1 The poles, ledgers, stringers, putlogs, bearers, platform planking, and other members of light duty, independent pole scaffolds of any height and heavy duty, independent pole scaffolds up to twenty-four (24) feet shall be the same as for "single pole" scaffolds (Section 2).

3.2 The inner row of poles shall be set as near the wall of the building as practicable and allow workmen sufficient working space.

3.3 The outer row of poles shall be set not less than six (6) feet and six (6) inches from the inner row for scaffolds up to twenty-four (24) feet in height, and not less than seven (7) feet and six (6) inches for scaffolds over twenty-four (24) feet in height.

3.4 The distance between poles longitudinally (or parallel to the wall) shall be the same as for "single pole" scaffolds.

3.4.1 As the independent pole scaffold receives comparatively little support from the building, it is important to strengthen and stiffen it thoroughly by systematic and careful bracing.

3.4.2 The outer row of poles shall be connected by diagonal bracing, at an angle of about 45 degrees with the horizontal.

3.4.3 The bracing should be securely fastened to the poles by a sufficient number of nails.

3.4.4 Diagonal braces, run in both directions, shall extend from pole on the outer face, or better, run up across the entire face of the scaffold, the braces being spliced at the poles by the addition of extra pieces continued in the same direction.

3.4.5 In very high or heavy duty scaffolds it is recommended that the inner row of poles be also braced in this manner, for while the bracing of the outer row may be sufficient, yet it adds extra stiffness to the scaffold.

3.5 The following schedule of members and minimum nominal dimensions is recommended for built-up wood scaffolds more than twenty-four (24) feet and up to forty (40) feet in height.

<u>MEMBERS</u>	<u>BRICKLAYERS</u>	<u>STONE MASONS</u>
Posts	4 x 4 in.	4 x 6 in.
Stringers supporting bearers	2 x 8 in.	2 x 8 in.
Bearers	2 x 8 in.	2 x 8 in.
Splices	1 x 4 in.	1 x 6 in.
Braces	1 x 6 in.	1 x 6 in.
Post spacing-longitudinal	7 ft. 0 in.	7 ft. 0 in.
Post spacing-transversely	10 ft. 0 in.	10 ft. 0 in.
Height between platforms	8 ft. 0 in.	8 ft. 0 in.
Planking	2 x 10 in.	2 x 10 in.

3.6 Members of other cross-sectional dimensions may be used if of equal strength with those given in the schedule.

3.7 All built-up wood scaffolds shall be constructed to support the working load with a factor of safety of four (4) regardless of any other specifications given as a minimum requirement.

3.8 When built-up scaffolds are erected more than forty (40) feet high, the size of members shall be increased so that a factor of safety of four (4) shall be maintained in the scaffold as a whole and in all its component parts.

3.9 Construction and erection of built-up wood scaffolds shall be in general accordance with the requirements as mentioned in Section 4 "General Requirements for Pole Scaffolds" wherever such requirements apply.

SECTION 4 - GENERAL REQUIREMENTS FOR POLE SCAFFOLDS

4.1 It is recommended that where pole scaffolds are erected more than forty (40) feet in height and in such places as to create a fire hazard endangering the workmen or beyond the reach of effective fire-fighting apparatus, that fireproofed wood or fire-resistive material be used in their construction.

4.2 See Section 5 for requirements for Tublar Pole Scaffolds.

4.3 All pole uprights shall be set up plumb.

4.4 Scaffold poles shall not stand directly on the ground, but shall bear on a foundation of sufficient size and strength to spread the load from the poles over a sufficient area to prevent settlement.

4.5 If the foundation is of wood, it should be a solid block or piece of plank not less than one (1) foot square by two (2) inches thick, or larger as required to distribute the load. The bearing block shall be placed on solid soil and sufficiently below the surface to prevent displacement. The base of the pole shall be set and securely held in the center of the block.

4.6 If a pole is set directly on a sidewalk or any substance other than wood, it shall be blocked or braced against movement.

4.7 Where necessary as a protection against the impact of trucks or other heavy moving equipment, the bases of scaffold poles shall be protected from displacement by bumpers (not attached to the scaffold).

4.8 Where poles are spliced, the squared end of the upper section shall rest squarely upon the squared end of the lower section, and the two (2) ends shall be rigidly fastened together with not less than two (2) wooden splice plates not less than four (4) feet long and having the same width as the pole. The plates shall be securely nailed in place on adjoining sides of the poles.

4.9 In heavy duty scaffolds the combined cross-sectional area of the splice plates shall be not less than the cross-sectional area of the pole.

4.10 The splice plates shall be so plated as to overlap the abutting ends of the pole equally, and shall be so located as not to interfere with the nailing of ledgers.

4.11 In light duty scaffolds not more than twenty-four (24) feet in height, poles may be spliced by overlapping the ends not less than four (4) feet and securely nailing them together. A substantial cleat shall be nailed to the lower section to form a support or rest for the upper section.

4.12 Adjacent poles, either transverse or longitudinal, shall not be spliced at the same level. Instead, all splicing shall be staggered.

4.13 Ledgers shall be long enough to extend over two (2) pole spaces and shall overlap the poles at each end by at least four (4) inches.

4.14 Ledgers shall always be spliced at poles, never in between.

4.15 As the platform is raised with the progress of the work, the ledgers upon which it previously rested shall be left in place to brace and stiffen the poles until the scaffold is dismantled.

4.16 All ledgers shall be nailed up level, and in the case of single pole scaffolds their top edges shall be at the same height as the bottom of the openings in the wall which receive the inner end of the putlogs so that both bearings of the putlog shall be at the same level.

4.17 Ledgers which support heavily loaded platforms shall be reinforced by bearing blocks, braces, or cleats securely nailed to the side of the pole from a support for the ledger.

4.18 Ledgers shall be securely nailed or bolted to each pole and except where they interfere with bracing shall be placed against the inside face of the pole.

4.19 Where two (2) ledgers overlap on the same pole, each shall be securely fastened, the under one first being nailed to the pole, then the outer one being nailed to and through the under one, the nails being kept distributed.

4.20 Where two (2) ledgers meet at right angles on a pole one shall be fastened on the inside and its end cut off flush with the face of the pole and the other ledger fastened on the outside and overlapping.

4.21 In nailing ledgers to the poles the nails shall be kept away from the top edge and the ledgers so nailed as to prevent splitting of the wood.

4.22 Ledgers with split ends shall not be used.

4.23 In nailing up ledgers, the nailing at one end shall be completed before nailing of the other end is commenced.

4.24 All putlogs or bearers shall be set with their greater dimensions vertical and long enough to project over the ledgers beyond the outer row of poles at least three (3) inches and beyond the inner row of

independent pole scaffolds for proper support and leaving sufficient working space.

4.25 Putlogs shall be supported on the ledgers and located against the sides of the poles and nailed to both pole and ledger, and where intermediate putlogs or bearers are used for the support of platform planking the ledgers shall be reinforced as necessary.

4.26 In single pole scaffolds the inner end of the putlog shall rest in the wall of the building with at least a four (4) inch bearing, and shall not be notched out or cut down except in alteration or light repair work, when they may be notched or cut down to fit into a space made by the removal of a brick. In such cases the notch shall be made on the upper side of the putlog and just deep enough to permit it being inserted in the hole in the wall.

NOTE: Putlogs with ends especially designed with a steel plate for resting in the wall without the removal of a brick are frequently used but their value as supports or bracing members depends entirely on the manner in which the bricks and mortar are laid up around them; the bricklayer giving no particular thought to the holding power that the putlog is expected to have.

4.27 When putlogs are removed in a single pole scaffold spring stay braces shall be inserted to take their place and shall be located at least in every alternate hole of every horizontal row of putlogs.

4.28 When a brick is inserted for holding the two (2) boards of a spring stay apart, it should be kept near the wall to ensure a good grip of the brace in the hole of the brickwork.

4.29 Ledgers shall be left in place to brace the scaffold.

4.30 In nailing the outer ends of a spring stay to the ledger, a sufficient number of nails shall be used to ensure a secure connection between the brace and the ledger.

4.31 When the inner end of a putlog is attached to a frame building, there shall be a piece of lumber, not less than two by six (2 x 6) inches and twelve (12) inches long notched out the width of the putlog and not less than two (2) inches deep, nailed to the side of the building to form a bearing.

4.32 The end of the putlog shall rest on the bearing and be nailed to both the bearing and the building.

4.33 When the inner end of a putlog comes in a window opening, it shall be supported on a stout plank or other support resting on the window sill, and the support securely braced against displacement.

4.34 Platform planking shall be not less than two (2) inches in thickness.

4.35 Planks shall be laid with their edges close together so the platform will be tight with no spaces through which tools or fragments of material can fall. Each plank shall be of sufficient length to extend over three (3) bearers and all ends shall be lapped over bearers.

4.36 Two (2) successive lengths of planking shall not abut upon a single putlog.

4.37 If planks are laid end to end, two (2) parallel putlogs shall be provided not more than eight (8) inches apart, so that one putlog will support the end of one plank, and the other putlog the end of the other plank.

4.38 Where platform planks overlap, a single putlog is sufficient, the ends of both the upper and lower planks overlapping the putlog by at least six (6) inches.

4.39 Platform planking shall project over the last putlog at the end of the scaffold by at least six (6) inches but in no case more than twelve (12) inches.

4.40 When a scaffold turns a corner, the platform planks shall be laid to prevent tipping. The planks that meet the corner putlog at an angle shall be laid first, extending over the diagonally placed putlog far enough to have a good safe bearing, but not far enough to involve any danger from tipping, then the planking running in the opposite direction at right angles shall be laid so as to extend over the rest on the first layer of planking.

4.41 When a platform is shifted or raised, the new ledger boards shall first be nailed to the poles at the proper height, then the putlogs or bearers set that are to support the new platform.

4.42 The old platform shall be left undisturbed until the new putlogs or bearers have been set in place, ready to receive the platform planks.

NOTE: Until the working platform is entirely planked over, it is advisable to leave a platform two (2) or three (3) tiers below the working platform to lessen the seriousness of accidents should men fall, and as a protection to persons below from falling tools and materials.

4.43 Diagonal bracing shall be provided to prevent the poles from moving in a direction parallel with the wall of the building or from buckling.

4.44 Cross bracing shall be provided between the inner and outer sets of poles in independent pole scaffolds.

4.45 The free ends of pole scaffolds shall be cross braced.

4.46 Scaffolds which extend to a height of more than forty (40) feet and support heavy loads of material shall be thoroughly and substantially braced as conditions require.

4.47 Braces which are used for the purpose of holding the scaffold at a fixed distance from the wall shall be secured to the poles.

4.48 Where the distance from the ground to the lower platform of pole scaffold is more than five (5) feet, access to the platform in the form of a runway or ladder shall be provided. Ladders or stairways shall also be provided for connecting the successive stages.

4.49 Safe means of access either by stairs or ladders shall be provided between the working platforms of all pole scaffolds.

NOTE: Where scaffolds are to be used for a considerable length of time, the erection of temporary stout plank stairways is recommended, constructed with heavy plank stringers and plank treads wide enough for two (2) people to pass, and provided with hand rails.

4.50 All stairways and ladders shall be adequately lighted when in use.

4.51 If portable ladders are used, the bottoms shall be fastened to the platform to prevent slipping or displacement, and the upper end shall extend at least three (3) feet above the platform and secured against displacement.

4.52 On all pole scaffolds adjacent to thoroughfares, side screens shall be provided to guard against falling material.

4.53 When there is an opening in the wall adjacent to a built-up scaffold which extends five (5) feet or more above the platform, a guardrail shall be erected across the opening.

4.54 If the space between the scaffold and building wall is more than eighteen (18) inches, a guardrail shall be erected on the wall side.

SECTION 5 - TUBULAR POLE SCAFFOLDS

5.1 Definitions.

5.1.1 POSTS. The posts in a tubular pole scaffold are the vertical supporting members.

5.1.2 RUNNERS. The runners in a tubular pole scaffold are the lengthwise horizontal members.

5.1.3 BEARERS. The bearers in a tubular pole scaffold are the cross-wise members carrying the platform planking.

5.2 The scaffold members shall be galvanized steel tubing.

5.3 All vertical and horizontal members shall be fastened together with a coupler or approved locking device, forming a positive connection. The locking device shall be of a type having no loose parts.

5.4 The locking device or coupler shall be of drop-forged steel, galvanized. The use of grey cast-iron fittings is prohibited.

5.5 In the construction of tubular pole scaffolds, members of the following dimensions are recommended.

5.5.1 LIGHT TYPE SCAFFOLD. In a light type tubular pole scaffold all posts, runners, and bearers to be of two (2) inch O.D. tubing, with the posts spaced six (6) feet apart by ten (10) feet along the length of the scaffold. All bracing to be of two (2) inch O.D. tubing.

5.5.2 MEDIUM TYPE SCAFFOLD. In a medium type tubular pole scaffold all posts and runners to be of two and one-half (2 1/2) inch O.D. tubing with the posts spaced six (6) feet apart by eight (8) feet along the length of the scaffold. All bracing to be of two (2) inch O.D. tubing.

5.5.3 HEAVY TYPE SCAFFOLD. In a heavy type tubular pole scaffold all posts and runners to be of two (2) inch O.D. tubing, and the bearers of two and one-half (2 1/2) inch O.D. tubing with the posts spaced six (6) feet apart by six feet, 6 inches (6ft. 6in.) along the length of the scaffold. All bracing to be of two (2) inch O.D. tubing.

5.6 For tubular steel scaffolds up to seventy-five (75) feet in height posts of two (2) inch O.D. tubing shall be used. For heights seventy-five (75) feet to two hundred (200) feet two and one-half (2 1/2) inch O.D. tubing shall be used.

5.7 All tubular pole scaffolds shall be designed to have a factor of safety of not less than four (4) and this or a larger factor of safety shall be observed in the use of every scaffold.

5.8 Posts shall be kept plumb during erection and the scaffold shall be subsequently kept plumb and rigid by means of adequate bracing.

5.9 The posts shall be fitted with bases supported on a firm foundation or sills to distribute the load. When wooden sills are used, the bases shall be fastened thereto.

5.10 On interior portable rolling scaffolds the foot of the poles shall be equipped with wheels or casters especially made for the purpose.

5.11 The tubing forming the runners shall be locked with fittings end to end and secured to each intersecting post with couplers.

5.12 The bottom runners shall be leveled both lengthwise and crosswise.

5.13 When attaching the upper runners, the couplers shall first be located at the proper height on the posts by means of a measuring stick.

5.14 Tubular bearers shall be placed at right angles to the runners and attached thereto with couplers.

5.15 Bearers shall be located at each set of posts and at each level, and also at intermediate levels where working platforms are installed.

5.16 Bearers shall be sufficiently long to provide an overhang of at least ten (10) inches beyond the inside and outside posts.

5.17 In the case of single pole tubular scaffolds the bearers or putlogs shall be equipped on the inner end with a three-sixteenth (3/16) inch steel clincher plate which shall hook into the vertical brick joint.

5.18 The bearers shall have a slight downward pitch toward the building wall.

5.19 Tubular bracing shall be applied both lengthwise and cross-

wise as required.

5.20 Lengthwise bracing shall be located on the outer face of the scaffold and secured to the projecting ends of the bearers with couplers or in some other approved manner.

5.21 Crosswise bracing shall be located at every fourth (4th) or fifth (5th) set of posts and be attached with couplers to the runners at alternate levels.

5.22 At the foot of posts where there are no horizontal runners or bearers to attach to, adjustable couplers shall be used for attaching the bracing to the posts.

NOTE: Wherever it is possible, the scaffold may be tied to the building through the window openings by means of scaffold members running through the openings and attached to other horizontal members spanning the opening both inside and outside, locking the scaffolds to the building. This form of bracing will greatly reduce the necessity for crosswise bracing.

5.23 Scaffolds shall be periodically inspected at frequent intervals while in use.

SECTION 6 - SUSPENDED SCAFFOLDS

6.1 The use of a suspended scaffold is recommended for all buildings more than five (5) stories high, built with a frame which will provide overhead support. The parts of the building or structure to which a suspended scaffold is attached shall be examined to determine if such parts are of sufficient strength to support properly the load that will be imposed on the scaffold.

6.2 A suspended scaffold shall be capable of sustaining a working load of forty (40) pounds per square foot with a factor of safety of four (4).

6.3 Suspended scaffolds shall never be used for the storage of stone or heavy materials.

6.4 All suspended scaffolds shall be provided with a hoisting machine of either the platform or overhead type.

6.5 All machines shall be of a design approved by the Underwriters' Laboratories.

6.6 The platforms shall be supported by steel wire ropes suspended from overhead thrustouts or outriggers.

6.7 The thrustouts or outriggers shall consist of steel "I" beams each securely anchored to the framework of the building by "U" bolts and anchor plates, tightened and made secure by washers and nuts.

6.8 If conditions arise where the use of the standard "U" bolt connection is not practicable, the use of the beam clamp connection is recommended.

6.9 If channel irons are used instead of "I" beams, they shall be in pairs, placed parallel and fastened together by pipe separators and bolts, with the flanges turned out.

6.10 The thrustouts shall be equivalent in strength to standard seven (7) inch 15.3 lb. "I" beams and shall be at least fifteen (15) feet long.

6.11 All beams and channels shall be set with their webs vertical.

6.12 The thrustouts (whether "I" beams or channels) shall project at least one (1) foot beyond the outer edge of the suspended platform.

6.13 A stop bolt shall be placed at the outer end of every thrustout.

6.14 Every man going out on a thrustout shall be provided with and shall wear a life belt, to which shall be attached a life line securely fastened to the building.

6.15 The life line shall be only of sufficient length to permit the work on the thrustout being performed, so that in the event of a fall the fall shall be as short as possible.

6.16 If it is necessary to raise the thrustout above the supporting beam, it shall be blocked up on the supporting beam with steel or hard wood blocking.

6.17 If the inner end of the thrustout extends inside the building, it shall also be secured to the building structure.

6.18 The suspensions when fixed at their upper ends shall be secured to the thrustouts by wrought iron shackles and bolts.

6.19 Inspection shall be made to see that the threads on all bolts are perfect, that the nut fits, and that the clamps holding the cables are securely fastened to the thrustouts.

6.20 It is recommended that steel wire ropes be used for the support of suspended platforms in preference to steel ribbons or chains, and that such ropes should have a breaking strength of not less than five (5) tons.

6.21 All parts of a suspended scaffold shall be inspected daily.

6.22 The upper end of the cables shall terminate in a spliced loop, in which a steel ring or eye is inserted, the bolt passing through the shackle and ring and drawn up tight by a nut, and, if necessary, a lock nut shall be used as an extra precaution.

6.23 The lower end of the supporting cable shall be secured to the hoisting machine by passing the end of the cable through a hole in the drum and securely fastening it by a clip, or by passing it through a hole in the web of one of the ratchet wheels, separating the strands, and securing them together with molten babbitt metal.

6.24 The shackle supporting the outside cable shall be placed not more than six (6) feet beyond the bearing point of the thrustout on a four (4) foot scaffold and the shackle supporting the inner cable shall be placed not more than two (2) feet beyond the bearing point of the thrustout. Where the scaffold floor is wider than four (4) feet, the outer cable shall be moved outward to permit the cable to hang vertically.

6.25 Where platforms wider than four (4) feet are required, the thrustouts shall be of sufficient additional strength to support the extra load imposed.

6.26 None but careful, experienced men shall be allowed to operate the machines.

6.27 The platform bearers shall be of steel, not less than a pair of two by two by three-sixteenth ($2 \times 2 \times 3/16$) inch standard angles, or other sections of equivalent strength.

NOTE: If wooden bearers are used, they shall be of long leaf yellow pine not less than four by six (4×6) inches in sectional area, or wood of equivalent strength with the greater dimension vertical.

6.28 The supporting frame of the hoisting machines shall be bolted to the bearers at the outer and inner ends with bolts not less than five-eighths ($5/8$) of an inch in diameter.

6.29 The bearers shall be of sufficient length to receive at least six (6) eight (8) inch planks with the inner and outer row of planks passing through or between the supporting frame of the hoisting machine.

6.30 In determining the width of the platforms, however, care shall be taken to have the suspension cables hang as nearly vertical as possible.

6.31 The platform planks shall be not less than two (2) inches thick, laid close together, and shall overlap the supporting barriers at each end of the scaffold not more than eighteen (18) inches.

6.32 Scrap iron hooks shall be wired to the suspension cables near the platform level and hooked over a beam in the building to prevent the scaffold swinging away from the building and fenders shall be used, consisting of pieces of plank nailed to the platform and projecting inward toward the building to keep the scaffold at the proper distance from the wall.

6.33 The outside of the platform shall be protected with a substantial railing of wood, not less than thirty-six (36) inches nor more than forty-two (42) inches high above the platform and a toe board not less than five and one-half ($5 \frac{1}{2}$) inches high.

6.34 The space between the toe board and the railing shall be filled with wire netting formed of No. 16 U.S. gage wire with one and one-half ($1 \frac{1}{2}$) inch mesh.

6.35 When men are working above a suspended scaffold, an adequate overhead protection shall be provided on the scaffold, consisting of planking heavy enough to serve as protection for the men on the scaffold.

This overhead protection shall be placed at a height of not more than nine (9) feet above the working platform and maintained at all times while men are at work.

6.36 All working parts of scaffold machines shall be left exposed so that defective parts or irregular working of the machine can be easily detected.

SECTION 7 - SWINGING SCAFFOLDS

7.1 This type of scaffold shall consist of a light platform supported at the ends by hangers and ropes that are attached to hooks, supported from the eaves of a building, the main cornice, parapet wall, or other substantial elevated point, and the hooks tied back to an anchorage on the building when conditions require.

A. TYPES OF SWINGING SCAFFOLD PLATFORMS

7.2 The swinging scaffold platform shall be one (1) of the three (3) following types: (A) The ladder type, consisting of boards upon a horizontal ladder, the sides of which are parallel; (b) The plank type, consisting of planks supported on the stirrups or hangers; (C) The beam type, consisting of longitudinal side stringers, with cross-beams set on edge and spaced not more than four (4) feet apart, on which the longitudinal platform planks are laid four (4) feet apart.

7.3 The platform of a swinging scaffold shall be not less than twenty (20) inches nor more than twenty-four (24) inches clear width.

7.4 Each end of the platform shall be supported by a wrought-iron stirrup or hanger, which in turn is supported by the suspension ropes.

7.5 The hangers shall be of standard design formed with a flat bottom to support the platform, with a loop to support the guardrail, an eye to support an intermediate guard rail, and a loop or eye at the top for securing the supporting hook on the block.

7.6 The stirrups or hangers shall be made of wrought iron or mild steel having a cross-sectional area equal to three-eighths by one and one-quarter ($3/8 \times 1 \ 1/4$) inch, or, if round, not less than three-quarters ($3/4$) of an inch in diameter.

7.7 The hangers shall be so designed as to support guardrails, and toe boards on both sides of the platforms when the nature of the work requires such protection.

7.8 LADDER TYPE PLATFORMS

7.8.1 The side stringers of the horizontal supporting ladder shall be of clear straight-grained spruce, or other wood of equal strength. Knots shall not exceed one-half ($1/2$) inch in diameter. Material with loose dead knots shall not be used.

7.8.2 The rungs shall be of straight-grained oak, ask, or hickory, not less than one and one-eighth ($1 \ 1/8$) inch in diameter with seven-eighths

(7/8) inch tenons mortised into the side stringers at least seven-eighths (7/8) of an inch.

7.8.3 The stringers shall be tied together with five-sixteenths (5/16) inch tie rods, located not more than five (5) feet apart, pass-in through the stringers and riveted up tight against washers at both ends.

7.8.4 The platform shall be of sufficient width to fill the space between the sides of the hangers and shall be securely fastened to the hangers by "U" bolts, passing around the hangers and bolted up tight on the inside face of the stringers.

7.8.5 The flooring shall be of spruce with upper surface dressed. The strips shall be spaced not more than five-eighths (5/8) of an inch apart, except at the side rails where the space may be one (1) inch.

7.8.6 The schedule for ladder type platforms given in Table 3 is recommended.

7.9 PLANK TYPE PLATFORM

7.9.1 When plank platforms are used, the planks shall be not less than two (2) inches thick and ten (10) inches wide.

7.9.2 All planks shall be of uniform thickness.

7.9.3 Where two (2) or more planks are used, they shall be tied together by cleats at least one by six (1 x 6) inches nailed on the underside at intervals of not more than four (4) feet.

7.9.4 The planks shall extend not less than six (6) inches nor more than twelve (12) inches beyond the supporting hangers.

7.9.5 A bar shall be nailed across the platform on the underside of each end to prevent it slipping off the hanger.

7.9.6 The clear space of the platform planks between supports shall not exceed ten (10) feet.

7.10 BEAM TYPE PLATFORMS

7.10.1 When beam type platforms are used, the side stringers shall be of straight-grained lumber, free from knots, and not less than two by six (2 x 6) inches, set on edge.

7.10.2 The stringers shall be supported on the stirrups or hangers, with a clear span between hangers not to exceed sixteen (16) feet.

7.10.3 The stringers shall be bolted to the hangers by "U" bolts passing around the hangers and bolted through the stringers with nuts drawn up tight on the inside face.

7.10.4 The ends of the stringers shall extend beyond the hangers not less than six (6) inches not more than twelve (12) inches at each end of the platform.

7.10.5 The platform shall be supported on cross beams two by six (2 x 6) inches cut in between the side stringers, thoroughly nailed thereto, and spaced not more than four (4) feet on centers.

7.10.6 The platform shall be not more than twenty (20) inches wide.

7.10.7 The platform shall be formed of boards with the top surface dressed, seven-eighths (7/8) of an inch thick by six (6) inches wide, nailed tightly together, and extended to the outside face of the stringers.

7.10.8 The ends of all platform boards shall rest on the back of the crossbeams, be through nailed and at no intermediate points in the length of the platform shall there be any cantilever ends.

TABLE 3 RECOMMENDED SCHEDULE FOR LADDER TYPE PLATFORMS

Length (Ft.)	Width Between	Cross Section of Side Stringers		Rungs	Tie Rods			
	Stringers (Inches)	At Ends (Inches)	At Middle (Inches)	No.	Diam. In.	No.	Diam. In.	Flooring (In.)
15	20	1 7/8 x 2 3/4	1 7/8 x 3 3/4	10	1 1/8	4	5/16	1/2 x 3
16	20	1 7/8 x 2 3/4	1 7/8 x 3 3/4	11	1 1/8	4	5/16	1/2 x 3
18	20	1 7/8 x 3	1 7/8 x 4	12	1 1/8	4	5/16	1/2 x 3
20	20	1 7/8 x 3	1 7/8 x 4	13	1 1/8	4	5/16	1/2 x 3
24	20	1 7/8 x 3	1 7/8 x 4 1/2	16	1 1/8	5	5/16	1/2 x 3

GENERAL REQUIREMENTS FOR SWINGING SCAFFOLDS

7.11 Every swinging scaffold shall be equipped the entire length of the platform on the side away from the building with a guardrail, an intermediate guardrail, or safety cable and a toe board.

7.12 The guardrail shall be of dressed lumber, straight-grained, not less than one and seven-eighths by two and seven-eighths (1 7/8 x 2 7/8) inches, supported in the loop formed in the hanger, and securely wedged or fastened to prevent displacement.

7.13 The railing shall be not less than thirty-six (36) inches nor more than forty-two (42) inches high above the platform.

7.14 The toe board shall be of wood, not less than five and one-half (5 1/2) inches high and securely nailed in place.

7.15 The ropes supporting a swinging scaffold shall be of first grade Manila rope, not less than three-quarters (3/4) of an inch in diameter, properly rigged into a set of standard six (6) inch blocks, consisting of at least one (1) double and one (1) single block.

7.16 All blocks shall fit the size of rope they carry, and shall be so constructed as not to chafe the rope running through them.

7.17 The suspension ropes shall run through blocks so the platform can be raised or lowered, the hook on the lower block being hooked in the loop or eye on the upper part of the hanger.

7.18 When the platform is in position, the suspension rope shall be made fast to the point of the hook by a properly made special hitch which cannot help.

7.19 At points where ropes are subjected to chafing, suitable padding shall be provided.

7.20 Where acid solutions are used on scaffolds that are to be raised more than fifty (50) feet in height, Manila rope shall not be used. In lieu thereof, a steel cable not less than five-sixteenths (5/16) of an inch in diameter, rigged to standard blocks or other approved device, shall be used.

7.21 All ropes and cables shall be carefully examined before each operation and every thirty (30) days thereafter when in use.

7.22 The supporting hooks or roof irons shall be of mild steel or wrought iron, forged with care, not less than seven-eighths (7/8) of an inch in diameter if round, and secured to a safe anchorage at all times.

7.23 Hooks shall be examined for flaws before being used.

7.24 Swinging scaffolds shall not be used for the storage of material.

7.25 Two or more swinging scaffolds shall not, at any time, be combined into one by bridging the distance between them with planks or any other form of connection.

7.26 The platforms of swinging scaffolds shall be lashed or secured while in use to hold them in position and prevent their swinging from the building, and shall be equipped with rollers or fenders which will bear against the side of the building, to hold the platform at a proper distance from the wall.

7.27 When workmen are leaving a swinging scaffold it shall be securely lashed to the building or lowered to the ground, and shall be cleared of all tools, buckets, or other movable objects.

7.28 Not more than two (2) men shall be permitted to work on a swinging scaffold at one time.

7.29 Every swinging scaffold shall be tested before using by raising the platform one (1) foot from the ground and loading it with at least four (4) times the maximum weight that will be imposed upon it when aloft.

7.30 Life lines securely fastened from above shall be provided for each man working on a swinging scaffold. The lines shall hang free of the scaffold and shall be of sufficient length to permit a safe landing.

NOTE: It is recommended that a life line with upper end fastened independently of the scaffold shall be provided and hang free extending to the ground, for each workman engaged on the scaffold, and when the nature of the work or other conditions make it expedient, each workman secure himself to the life line by passing it through a ring attached to a life belt around the body.

SECTION 8 - MASONS' SWINGING SCAFFOLD

8.1 Swinging scaffolds intended for masons' use in setting stone or cleaning down walls shall be similar in design to other swinging scaffolds, but shall have a platform at least thirty (30) inches wide and suspended from overhead steel beam out-riggers with steel wire cables and operated by a scaffold machine.

8.2 The scaffold shall not be used for the storage of stone or other heavy material.

8.3 The platform shall be not more than twenty (20) feet in length constructed of four (4) inch channel located at each end of the platform, laid flat with the flanges down, and slotted to receive the machine hangers.

8.4 The two (2) side stringers shall be bolted to the channels, with cross bearers and flooring similar in construction to the beam type platform.

8.5 There shall be five-sixteenth (5/16) inch tie rod located seven (7) feet from each end of the platform, passing through the side stringers and drawn up tight with washers, nuts, and lock nuts.

8.6 A guardrail shall be provided along the outer side of the scaffold not less than thirty-six (36) nor more than forty-two (42) inches high above the platform, secured to angle iron uprights bolted to the stringers.

8.7 The uprights shall be located at each end of the platform and two (2) between, equally spaced.

8.8 The space between the guardrail and platform shall be filled with a wire netting screen formed of No. 16 U.S. Gauge wire with one and one-half (1 1/2) inch mesh securely fastened in place.

8.9 When two (2) or more such scaffolds are in use on a building, they shall not be bridged across, one to the other, or tied or lashed together.

8.10 Life lines (one for each workman engaged on the scaffold) shall be provided as mentioned in PART 13, Section 6.

SECTION 9 - OUTRIGGER SCAFFOLD

9.1 Outrigger scaffolds shall be constructed of heavy timber thrustouts or outriggers not less than three by ten (3 x 10) inches, set on edge, projecting through the wall or window opening not more than six (6) feet from the face of the building, with the inner end extending into the building, supported, braced, anchored, and securely fastened in place. Outriggers of steel also may be used.

9.2 Outrigger scaffolds shall be erected only by mechanics skilled in their construction, and shall be thoroughly inspected before being used.

9.3 Thrustouts shall not be built into a wall and left with no other support.

9.4 The projecting ends of thrustouts shall be supported by external braces or struts when extra support is required, but these shall not be depended upon as the main support.

9.5 Thrustouts shall be spaced not to exceed six (6) feet on centers.

9.6 The thrustouts shall be rigidly held against turning or buckling.

9.7 The platforms shall be constructed of planks two by ten (2 x 10) inches securely nailed to the thrustouts, and laid close together except for a one(1) inch space along the wall of the building.

9.8 The ends of all planks shall rest on the back of the thrustouts and shall project not more than twelve (12) inches beyond the ends of the scaffolds.

9.9 Every outrigger scaffold shall be provided with a guardrail not less than thirty-six (36) nor more than forty-two inches (42") high supported on uprights securely nailed to the thrustouts. These uprights shall be long enough to drop twelve (12) inches below the thrustout and the lower end securely braced thereto.

9.10 A toe board shall be provided along the platform at least five and one-half (5 ½) inches high, and the space between the toe board and guardrail filled with a wire screen formed of No. 16 U.S. gauge wire and one and one-half (1 ½) inch mesh.

9.11 Outrigger scaffolds shall never be used for the storage of materials.

9.12 When working platforms are suspended from the thrustouts, they shall be supported by vertical hangers of not less than two by six (2 x 6) inch lumber and not more than ten (10) feet long securely nailed to the side of the thrust-out and extending at least ten (10) inches above the top of the thrustout and nailed to a block which shall rest on the top edge of the thrustout as an additional support.

9.13 The suspended platform shall be supported on two by six (2 x 6) inch beams, nailed to the vertical hangers, and resting on a block that shall be spiked to the side of the hanger below the beam as an additional support.

9.14 The suspended platform shall be formed of two by ten (2 x 10) inch planks nailed close together across the back of the bearers, and provided with a guardrail, toe board, and wire screen protection as hereinbefore mentioned.

9.15 The suspended platform shall be braced to prevent swaying.

9.16 Horse scaffolds shall not be erected upon the platform of an outrigger scaffold to gain additional height.

SECTION 10 - CARPENTERS' BRACKET SCAFFOLDS

10.1 Carpenters' bracket scaffolds shall be constructed of triangular framed portable brackets and platforms of planks.

10.2 The brackets shall be built up of good, straight-grained, dressed material each member not less than two by three (2 x 3) inches, and mortised together and bolted.

10.3 The supporting bolt shall be not less than five-eighths (5/8) of an inch in diameter welded to a flat iron member, not less than two (2) feet long, drilled, spiked, and set in flush with the top surface of the horizontal member, of sufficient length to extend well inside the studs (when secured to a frame building) and provided with washer and lever-handled nut.

10.4 In erecting a bracket, a two by six (2 x 6) inch block shall be laid horizontally across the inside of two (2) studs, with the bolt passing through the block and screwed up tight.

10.5 There shall be at least two (2) inches of threaded bolt beyond the nut when screwed up.

10.6 The supporting bolt shall be frequently inspected and renewed when the threads show signs of wear--likewise the lever-handled nut.

10.7 The brackets shall be of sufficient strength to carry a load of four hundred (400) pounds located at the extreme outer end of the bracket.

10.8 Brackets which have become weakened or damaged by use shall not be used.

10.9 The platform shall be formed of plank, not less than two (2) inches thick, laid tight together, and not less than two (2) planks wide, the ends overlapping the bracket not less than six (6) inches nor more than twelve (12) inches and the bracket shall be spaced not more than twelve (12) feet apart.

10.10 All planks shall be lapped over the brackets and all "traps" avoided from overhanging ends.

10.11 When bracket scaffolds are used at heights exceeding twelve (12) feet, guardrails shall be installed, formed by spiking vertical uprights to the horizontal members, and braced back by spiking a brace to the side of the uprights and the bracket, and a guardrail spiked along the top of the uprights.

SECTION 11 - BRICKLAYERS' SQUARE SCAFFOLD

11.1 This type of scaffold shall be composed of framed wood squares or jacks supporting a plank platform.

11.2 The squares of jacks shall be framed up of clear material, top and bottom and the two upright members, two by four (2 x 4) inches, corners

abutting one another with the top and bottom members overlapping the uprights.

11.3 In addition to nailing the corners, they shall be braced on both sides of each corner with one by six (1 x 6) inch bracing pieces cut in the form of a triangle.

11.4 The squares shall have braces one by eight (1 x 8) inches in size on both sides running from the center of each member to the center of the adjacent member.

11.5 The squares shall be not larger than five (5) feet on each side, and the width of the base not less than the height.

11.6 When the squares are set up they shall be braced laterally by one by six (1 x 6) inch bracing on both the front and rear sides of the scaffold, the bracing extending from the bottom of one square to the top of the next adjacent square.

11.7 The squares shall be set up not more than five (5) feet apart on heavy duty scaffolds, not more than eight (8) feet apart on light duty scaffolds.

11.8 Platform planks shall be at least two (2) inches in thickness by ten (10) inches wide, with the ends of planks overlapping on the back of the squares, and each plank shall extend over three (3) squares.

11.9 The ends of all planks shall overlap the squares by at least four (4) inches and not more than six (6) inches.

11.10 When this type of scaffold is used, it should not be built up more than three (3) tiers of squares high, and the tiers should be braced together both front and rear, as necessary, to give stability and rigidity.

11.11 The squares shall be placed directly one above the other.

11.12 The upper tiers shall stand on continuous rows of planks laid across the lower tier, nailed down and cleated on the underside on each side of the supporting square to prevent movement of the planks and prevent swaying of the scaffold.

11.13 The scaffold shall be set up on a level and unyielding foundation.

11.14 Squares hinged together to be used as horses shall be provided with a tie across the bottom to prevent spreading to a distance more than two-fifths (2/5) the height of the square.

11.15 The distance between squares when used as horses should not exceed twelve (12) feet.

SECTION 12 - NEEDLE BEAM SCAFFOLDS

12.1 Needle beam scaffolds shall be used only for the support of men doing riveting and other light work, and never used for the storage of materials.

12.2 Lumber for needle beam scaffolds shall be made of straight grained, selected material free from knots, shakes, and weaknesses of every kind. Lumber shall not be painted; it may be coated with linseed oil or other transparent protective coating.

12.3 When needle beams are not more than twelve (12) feet in length between supports they shall be not less than four by six (4 x 6) inches in size with the greater dimension vertical, and shall be increased in size when longer, or when required for the loads they are to support.

12.4 Long needle beams shall be provided with intermediate supports or hangers.

12.5 Needle beams shall always be in one length; spliced or built-up beams shall never be used.

12.6 Ropes used for the support of needle beams shall be first class in quality and made of pure Manila fiber.

12.7 The ropes shall be attached to the needle beams by a "scaffold hitch" or a properly made eye splice looped over the standing part of the rope and the loose ends of the rope tied to the supporting rope by a "bowline knot" or a round-turn and two half-hitches.

12.8 The scaffold hitch shall be so arranged as will prevent the needle beam from rolling or becoming otherwise displaced.

12.9 The size of the rope shall be appropriate for the weight to be supported, but rope smaller than one (1) inch in diameter shall never be used.

12.10 Padding shall be used to protect the rope at points where it is subject to cutting or chafing.

12.11 The rope shall be attached to the beam at a point not less than one (1) foot from the end, and provisions shall be made to prevent it slipping over the end of the beam.

12.12 Every needle beam scaffold shall be examined by the man in charge of the work before being used by the workmen.

12.13 When the space between needle beams is twelve (12) feet or less, the platform planks shall be two (2) inches thick by at least ten (10) inches wide and increased in thickness as the clear span increases.

12.14 Platforms shall be not more than six (6) feet wide. When the platform is suspended inside a building it should be not less than two (2) feet and six (6) inches wide, and when suspended outside a building it should be not less than three feet (3) wide.

12.15 Platform planks shall be at least two (2) feet longer than the span between needle beams.

12.16 When needle beam scaffolds are used where one beam is higher than the other, the planks shall be secured against slipping. A hole shall be bored through each end of every plank, with a bolt slipped through the

hole and provided with a tightly fitting nut. The bolt should be not less than five-eighths (5/8) of an inch in diameter and the bolt not less than eight (8) inches long. The planks shall be laid with the bolts outside the supporting beams.

12.17 When platform planks are used in steeply inclined positions, they shall be provided with cleats to prevent slipping, at least one and one-half by two (1 ½ x 2) inches, spaced not more than eight (8) inches apart, and securely nailed to the plank.

12.18 Needle beams shall be secured against displacement and when one end is supported on the building structure, the support shall be not less than six (6) inches.

12.19 When needle beam scaffolds are used for rivet heaters, the platform shall be the full permissible width of six (6) feet and not less than ten (10) feet long with planks laid close together and all edges provided with standard toe boards.

12.20 All needle beam scaffolds shall be substantially constructed to support the load that is to be imposed, with a factor of safety of four (4).

12.21 When steel or wrought-iron pipe is used for needle beams, it shall be free from rust or scale. When the scaffold span is not more than twelve (12) feet, the pipe should be at least three and one-half (3 ½) inches in diameter, when more than twelve (12) feet and not more than sixteen (16) feet the diameter should be four (4) inches and correspondingly increased with the span.

12.22 Railings as specified elsewhere in this code shall not be required on needle beam scaffolds.

SECTION 13 - FLOAT, OR SHIP, SCAFFOLDS

13.1 Scaffolds of this type shall be used only for the support of men doing riveting or other light work. Not more than two (2) men shall work on such a scaffold and it shall not be used for the storage of materials.

13.2 Lumber shall conform to specifications stated in rules 1.8, 1.9, and 1.10 of PART 9 of this code.

13.3 Planks for platforms and bearers shall be in one length. No spliced material shall be used.

13.4 Platforms shall be not more than five (5) feet wide and eight (8) feet long, but preferably should be not more than four (4) feet wide and seven (7) feet long.

13.5 The supporting planks shall be of not less than two by eight (2 x 8) inch lumber and should project not less than six (6) inches beyond the platform on both sides. An additional diagonal plank of not less than one by six (1 x 6) inch lumber shall extend from bearer underneath the platform and each platform plank shall be nailed to this diagonal board and to the two (2) parallel plank bearers.

13.6 The platform shall be of not less than two (2) inch planking lumber.

13.7 Ends of platform planks shall extend at least six (6) inches beyond the outer edges of the bearers.

13.8 Supporting ropes should be of the best quality Manila fiber. If substitute material must be used, it shall be of a size to provide strength equivalent to Manila as specified in rule 13.9.

13.9 Ropes shall be of a size sufficient to support the suspended load with a safety factor of four (4), but in no case smaller than seven-eighths (7/8) inch in diameter.

13.10 The platform shall be supported by a continuous rope at each end, the ends of each rope being securely fastened to an adequate overhead support.

13.11 The scaffold platform shall be so secured to the suspending ropes that slipping is impossible. Each supporting rope should pass downward through a one (1) inch hole in the bearer plank, being single-hitched around the bearer plank and pass along beneath it to the other end, where it should again be single-hitched and pass upward through a similar hole to the overhead support.

13.12 The holes in the bearer planks as specified in rule 13.11 should be approximately two (2) inches outside the outer planks.

13.13 Every float scaffold shall be examined by the foreman in charge before being used and at regular intervals thereafter.

13.14 Material sizes given herein are the minimum recommended. All parts of the scaffold shall be designed to support the suspended load with a safety factor of four (4).

13.15 Railings and toe boards as specified elsewhere in this code shall not be required on float scaffolds.

SECTION 14 - HORSE SCAFFOLD

14.1 All horses used for building scaffold purposes shall be rigid and of solid, strong construction.

14.2 Horses shall be made of sound, straight-grained material, and braced so as to be rigid and to resist deformation from side thrusts.

14.3 Horses or parts of horses which have become unstable, or weakened in any way, shall not be used until repaired or made strong and rigid.

NOTE: It is advisable to make a new horse rather than repeatedly repair one that has become loose or weakened through use.

14.4 A well designed horse should have a spread between the foot of the legs of about twenty-three (23) inches, tapered in towards the top, and

stand about forty-eight (48) inches high. The top horizontal members should be about forty-eight (48) inches long.

14.5 The following nominal size material for a well constructed strong horse four (4) feet long is recommended:

Horizontal members of bearers	3 x 4
Legs	2 x 4
Longitudinal brace between legs	1 x 6
Gussett brace at top of legs	1 x 8
Half diagonal braces	1 x 4

14.6 If the horse is longer than four (4) feet or higher than four (4) feet, the cross section of the members should be increased and the horse rigidly braced.

14.7 The nailing of extension pieces on the legs of horses to increase the height shall be prohibited.

14.8 All horse scaffolds shall be set on substantial and level foundations, with the legs standing on sections of stout plank and not on the earth.

14.9 Each and every platform plank shall be supported on three (3) horses, one (1) at each and one (1) in the middle.

14.10 If all horses are not exactly the same height, shim pieces shall be used on the back of horses so that all planks will get a solid bearing.

14.11 Planks shall be two (2) inches in thickness and laid with their edges close together.

14.12 Planks shall be laid so there is no danger from tipping, and horses placed near enough together so there is no spreading or springing in the planks.

14.13 Horses shall not be spaced more than five (5) feet apart for heavy duty scaffolds, nor more than seven (7) feet and six (6) inches for a light duty scaffold.

14.14 Horse scaffolds shall not be erected more than three (3) tiers of horses or more than twelve (12) feet high.

14.15 In erecting successive tiers of horses, each horse shall be placed directly over the horse in the tier below.

14.16 If a slight increase in the height of a platform is desired, small piers of brick or tile may be built up on the top scaffold plank to support the raised platform but not more than twelve (12) inches high.

14.17 Horses shall not stand directly on the back of beams or joists, but shall stand on a strong temporary flooring of planks, and if the floor is of concrete, it shall be allowed to set before the weight of the horse is placed upon it, and if the floor is a tile arch or concrete joist construction the legs of the horses shall be placed on planks.

14.18 On all scaffolds more than two (2) tiers high, the legs of the horses shall be nailed down to the planks to prevent displacement and to avoid pressure, thrusts of ladders, or other causes, and the tiers of horses braced together.

14.19 If ladders are placed against a horse scaffold they shall be located near the horses, and the plank against which they rest firmly nailed down, and the horses that support the planks also nailed to the plank upon which they stand.

14.20 When it is necessary for protection of workmen below, a toe board shall be provided on the outer edge and ends of the scaffold and shall be not less than five and one-half (5 ½) inches in height, securely braced and fastened in place.

14.21 Where horse scaffolds are erected three (3) tiers high, guardrails shall be provided on the top tier.

SECTION 15 - PLASTERERS' AND DECORATORS' INSIDE SCAFFOLDS

15.1 Lathers', plasters' and decorators' inside scaffolds shall be constructed in general accordance with the requirements for pole scaffolds . (See Sections 4 and 5).

15.2 When a portable scaffold for light work is formed of scaffold planks supported on hinged or trestle ladders, the foot of the ladders shall be secured against spreading beyond a safe distance and opened up the full spread before laying on the planks.

15.3 Single ladders leaning against the wall for the support of platform planks shall be prohibited.

15.4 Ladders used on slippery floors or set on sloping surfaces shall be secured against slipping.

15.5 Platform planks up to nine (9) foot span used on ladders shall be not less than ten (10) inches wide and one and one-half (1 ½) inches thick.

15.6 When work is to be done that cannot be reached safely from scaffold planks placed on ladders, pole scaffolds shall be erected.

15.7 For pole scaffolds up to forty (40) feet in height the following minimum nominal size material is recommended:

Poles	2 x 4 in.
Runners	1 1/8 x 4 in.
Bearers	2 x 6 in.
Splice pieces for posts	1 1/8 x 4 in.
Braces	1 1/8 x 4 in.
Spacing of posts—Longitudinal	6 ft. 4 in.
Spacing of posts—Transverse	12 ft. 0 in.
Section spacing—Vertical	6 ft. 6 in.
Planking	2 x 10 in.

15.8 When scaffolds are more than forty (40) feet high, poles shall be not less than four (4 x 4) inches.

15.9 All poles shall be erected plumb, and braced as they are placed in position.

15.10 Pole scaffolds shall be braced in both directions, except when they occupy an entire room, and come in contact with walls.

15.11 Where a clearance is required, padded thrustouts may be extended out from the poles to give steadiness against vibration or deformation.

15.12 Adjacent poles shall not be spliced at the same level.

15.13 All runners and braces shall extend over two (2) pole spaces.

15.14 Guardrails shall be erected on all exposed sides of all platforms.

15.15 All platform planks shall be laid with the edges close together to prevent the falling of tools and material.

15.16 When pole scaffolds are erected in sections, communication between them by means of unprotected plank platforms shall be prohibited.

15.17 Where such connection is required, substantial platforms shall be erected and provided with guardrails.

15.18 INTERIOR, HUNG SCAFFOLDS

15.18.1 Where an interior, hung scaffold is required for ceiling decoration, it shall be hung or suspended from the roof structure or substantial ceiling beams.

15.18.2 For hanging scaffolds, the following minimum nominal size material is recommended:

Supporting Bearers	2 x 10 in.	12 ft. on centers
Joists	3 x 4 in.	24 ft. on centers
Planking	2 x 20 in.	
Wire Cables	½ in. diameter and a breaking strength of 10,000 lbs.	
Spacing of cables	10 ft. to 12 ft.	

15.19 Irrespective of the above schedule, all hanging scaffolds shall be designed to sustain a uniformly distributed working load of at least fifteen (15) pounds per square foot, and when used for plastering shall be designed to sustain a distributed working load of at least twenty-five (25) pounds per square foot each, with a factor of safety of four (4).

15.20 Where materials are to be handled or stored on the scaffold, which will load the scaffold beyond the working loads mentioned above, the size of the members shall be increased to provide the same factor of safety of four (4).

15.21 The hanging scaffold shall be supported by means of wire cables which shall be wrapped twice around the supporting members and twice around the floor beams or bearer of the scaffold.

15.22 Each end of the cable shall then be secured by at least three (3) standard cable clips.

15.23 All overhead supporting members shall be inspected and checked for strength before the scaffold is erected. Platforms of hanging scaffolds shall be closely planked.

SECTION 16 - LADDER JACK SCAFFOLDS

16.1 All ladder jacks shall be of an approved type.

16.2 Ladder jack scaffolds shall not be used at a greater height than twenty-two (22) feet above the ground or working level.

16.3 Ladder jacks shall not be used on extension ladders.

16.4 Not more than one (1) person shall be allowed to work on a ladder jack scaffold at any one time.

16.5 The ladder jack shall be clamped or otherwise securely fastened to the ladder and shall bear on the side rails.

16.6 Platform planks shall be at least two (2) inches thick by ten (10) inches wide and shall overlap the bearing surface at least four (4) inches and not more than eight (8) inches at each end.

16.7 Platform planks shall not have a greater span than ten (10) feet unless provided with a center support.

16.8 All ladders used in conjunction with ladder jacks shall be designed and constructed in accordance with the requirements specified in PART 10, "Ladders".

16.9 All ladders used in conjunction with ladder jacks shall be so placed, fastened, held, and equipped with safety shoes, metal spikes, or spurs as to prevent slipping.

16.10 When ladder rungs are used for support of platform planks, not more than one (1) plank shall be placed on a rung, and not more than one (1) workman shall be allowed to stand on it at any one time.

SECTION 17 - WINDOW JACK SCAFFOLDS

17.1 All window jacks shall be of an approved type.

17.2 Window jack scaffolds shall be used only for the purpose of working at the window opening through which the jack is placed.

17.3 Not more than one (1) person shall be permitted on a window jack scaffold at any one time.

17.4 Window jacks shall be constructed to sustain a working load of at least two hundred (200) pounds with a factor of safety of four (4).

17.5 The placing of planks between one window jack and the jack of an adjacent window shall be prohibited.

17.6 Window jacks shall not be used as the supporting element of scaffolds.

SECTION 18 - ROOFING BRACKETS

18.1 Roofing brackets shall be triangular in shape, formed of three (3) pieces of two by four (2 x 4) inch scantling with the diagonal member sloped to fit the pitch of the roof, and the horizontal member level to support the roof plank.

18.2 Roofing brackets shall be securely supported by means of ropes fastened to a hook securely hooked over the ridgepole of the roof, and to a five-eighths (5/8) of an inch eye-bolt securely screwed into the roofing bracket, or by means of pointed projectors driven their full length in the frame of woodwork of the roof.

18.3 The ropes shall be first class Manila fiber three-quarters (3/4) of an inch in diameter.

18.4 The ropes may also be secured to chimneys or roof members or other solid objects on the farther side of the roof.

18.5 When work is done on roofs which are more than twenty (20) feet from the ground to the eaves, and where there is not parapet wall at the eaves, and such roof has a slope greater than three (3) inches in one (1) foot, a substantial catch platform or scaffold platform is recommended of sufficient width to extend at least two (2) feet beyond the outer edge of the eaves projection, and such platform should be equipped with a guardrail.

18.6 As an alternative to such a platform, each man working on the roof should be provided with a life line of first grade Manila rope securely fastened to a safe anchorage.

NOTE: When roof shingling is done without the use of roofing brackets, pieces of horizontal scantling may be used.

The scantling should be two by four (2 x 4) inches in section, with several shingles nailed to it at different points in its length in such a way that the butt of each shingle comes flush with the edge of the scantling.

It is then turned over, so that the shingles come next to the roof, and placed so the upper edge of the scantling coincides with the lower edge of the next course of shingles and the shingles are then nailed down to the roof.

The scantling is then used for support, and the work proceeds until the shingles have been laid to such a height that another strip is required and laid in like manner.

After completion of the work, the scantlings are removed either by sawing off the shingles to which they are nailed, leaving the thin upper end of the shingles in position, or by removing the shingles by loosening the nails by which they are secured to the roof.

The scantlings are also frequently fastened to strips of sheet zinc which are nailed to the roof. When the shingling is finished, the zinc strips are cut off flush with the butts of the course of shingles that overlap them and are left in position.

SECTION 19 - CRAWLING BOARDS OR CHICKEN LADDERS

19.1 Where crawling boards or chicken ladders are used on roof work, they may be either single or double.

19.2 A single crawling board should be at least ten (10) inches wide and not less than one (1) inch thick, to which shall be nailed cross strips or cleats as long as the width of the board, at least one and one-half (1 ½) inches wide by one (1) inch thick.

19.3 The board shall be laid on the roof so that its length extends from the ridge-pole down to the eaves--with the upper end securely fastened to the ridge with hooks or a cleat on the upper end to engage the ridge so that the board cannot become loose and slide down.

19.4 Where double boards are used straddling the ridge, each section shall be made similar to the single board, with the two (2) sections hinged or bolted together.

19.5 Double boards shall be laid with the sections straddling the roof, with the hinge bolt resting on the peak or ridgepole.

19.6 When crawling boards are used on roofs where the pitch is more than three (3) inches in one (1) foot, a catch platform or life lines shall be used.

SECTION 20 - BOATSWAIN'S CHAIR

20.1 Whenever a boatswain's chair or seat is used, it shall be constructed and erected with the greatest possible care.

20.2 The chair shall be a seat not less than two (2) feet long by one (1) foot wide and one (1) inch thick.

20.3 Cleats shall be nailed to the underside of each end of the chair and shall project at least nine (9) inches in front of the seat.

20.4 The chair shall be supported by means of a sling attached to a suspension rope.

20.5 The suspension rope shall either be securely fastened to a fixed object overhead, or passed through an overhead block securely fastened, with the free end securely fastened to a fixed and easily accessible object, and the chair raised or lowered if necessary with the aid of helpers.

20.6 When the suspension rope is attached to a pole by means of a hitch, the workman shall be provided with stirrups upon which he can rest his weight while he is shifting the hitch by which the chair is made fast, and the stirrups shall be supported independently of the chair itself.

20.7 Every workman using a boatswain's chair shall be provided with a safety belt secured to the supporting tackle in such a way that he will be safe in case he falls from the chair.

20.8 When a boatswain's chair is used by a workman using a blow torch, or any open flame, fiber rope sling shall not be used. The slings shall be at least three-eighths (3/8) inch wire rope.

SECTION 21 - SECTIONAL METAL SCAFFOLDS

21.1 Sectional metal scaffold shall be of three (3) types--light-duty, medium-duty, and heavy-duty type. Each type shall be constructed of the following minimum structural sections and shall not be erected higher, except by approval, than specified and shall not carry loads greater than those provided by this code.

(a) Light-duty scaffolds shall have a maximum uniform load-carrying capacity of twenty-five (25) pounds per square foot and shall be limited to a maximum height of forty feet. The load may be concentrated on one level or divided among various levels. The maximum space between section frames shall not exceed ten (10) feet.

(b) Medium-duty scaffolds shall have a maximum uniform load-carrying capacity of fifty (50) pounds per square foot and shall be limited to a maximum height, except by approval, of one hundred twenty-five (125) feet. The load may be concentrated on one level or divided among various levels. The maximum space between section frames shall not exceed ten (10) feet.

(c) Heavy-duty scaffolds shall have a minimum uniform load-carrying capacity of seventy-five (75) pounds per square foot and shall not exceed the manufacturer's recommended height, and in no case one hundred twenty-five (125) feet without approval. The load may be concentrated on one level or divided among various levels. The maximum space between section frames shall not exceed seven (7) feet.

21.2 The coupling pins for connecting the posts of the frame sections shall be of rolled or drop-forged steel or other metal of equal strength. The use of gray iron fittings is prohibited. In addition to the coupling pins, each frame shall have a positive integral lock or fastener to hold one section to other vertically.

21.3 A base plate shall be attached to the foot of the post of the scaffold frame by a telescoping device screws into the foot of the post, or is adjusted by a screw, the screw shall have square-cut threads and be capable of carrying the imposed load. All base plates shall rest on firm foundations and be securely fastened to mud sills when sills are used.

21.4 Cross-bracing members for tying the frames together laterally shall be of uniform length, automatically squaring and aligning the frames so that the erected scaffold is also plumb, square and rigid. The cross-bearing members shall be attached in a secure manner to the post members of the frames.

21.5 In reference to portable rolling metal scaffolds, the foot of each post shall be equipped with a wheel or caster especially made for the purpose and provided with a locking device. Portable (castored) scaffolds must not be moved when occupied under any circumstances. As to the spans for painters, decorators, and maintenance workers, portable rolling metal scaffolds may be ten (10) feet in length, provided a reinforced platform or stage is used. Spans of other portable rolling metal scaffolds shall not exceed seven (7) feet in length. Where the height is greater than four times the width of the base, rolling scaffolds shall be securely guyed or braced against tipping.

21.6 All sectional metal scaffold members shall be painted or coated with weather and rust-resisting material. Exception: Non-ferrous materials.

PART 11

LADDERS

SECTION 0 - DEFINITIONS

0.1 LADDER. The term "ladder" shall mean an appliance or piece of equipment usually consisting of two (2) side rails joined together at regular intervals with cross pieces called steps, rungs, or cleats and used in ascending or descending between two (2) points at different levels.

0.2 SINGLE PORTABLE LADDER. The term "single portable ladder" shall mean a ladder of but one section, the side rails of which may be parallel or spread wider at the bottom, capable of being moved and used in various locations.

0.3 FIXED LADDER. The term "fixed ladder" shall mean a ladder fastened to a structure in a permanent position, and securely held in place by top, bottom, and intermediate fastenings as required.

0.4 PORTABLE STEPLADDER. The term "portable stepladder" shall mean a ladder with wide, flat steps secured to the side rails and constructed with a hinged section to be self-supporting.

0.5 EXTENSION LADDER. The term "extension ladder" shall mean a ladder of two (2) or more sections traveling in guides or brackets so arranged that it may be adjusted to variable lengths.

0.6 TRESTLE OR "A" LADDER. The terms "trestle" or "A" ladder shall mean a ladder consisting of two (2) single ladder sections hinged together at the top which when spread form equal angles with the base.

0.7 EXTENSION TRESTLE LADDER. The term "extension trestle ladder" shall mean a ladder consisting of an "A" or "trestle" ladder, hinged at the top to form equal angles with the base when spread, and with an additional single ladder section having parallel sides, which can be adjusted vertically, and provided with a device to lock it in place.

0.8 SECTIONAL LADDER. The term "sectional ladder" shall mean a ladder consisting of two (2) or more sections, so constructed that the sections can be combined, end to end, and function as a single ladder.

0.9 MANHOLE LADDER. The term "manhole ladder" shall mean a ladder used exclusively in manholes, or vaults below grade.

0.10 ROOF LADDER. The term "roof ladder" shall mean a ladder, fixed in place and providing access to a roof from the uppermost landing of a fire escape, or from a roof to an upper level.

0.11 CLEAT LADDER. The term "cleat ladder" shall mean a ladder consisting of one (1) section, having two (2) side rails and steps formed of cleats housed into the face of the side rails.

0.12 DEFECT. A "defect" is any characteristic or condition in a piece of wood which tends to weaken or reduce its strength.

0.13 KNOT. A "knot" is that portion of a limb or branch which occurs at its incorporation in the trunk or body of a tree. All rules herein relating to the presence of knots apply only to that portion of the knot which appears on the surface of the wood; and all rules relating to the size of the knots apply to the mean or average diameter as measured on the surface.

0.14 CROSSGRAINED WOOD. "Cross-grain" (slope of grain) is a deviation of the fiber from a line parallel to the sides of the piece. Cross-grain may be in terms of its slope, which is established as the distance along the sides of the piece in which a deviation of grain of one (1) inch occurs. For example, a distance of 12 inches, the grain deviates 1 inch from the edge of the piece. The slope of grain shall be measured over a distance which will assure the determination of the general slope of the grain not influenced by short local deviations.

0.15 SHAKE. A "shake" is a separation along the grain, which occurs between the rings of annual growth.

0.16 CHECK. A "check" is a separation along the grain, which occurs across the rings of annual growth.

0.17 PITCH POCKET. A "pitch pocket" is a well defined opening between rings of annual growth,, usually containing, or which has contained more or less pitch, either solid or liquid. Bark may also be present in the pockets.

0.18 DECAY. "Decay" is the destruction of wood due to wood-destroying fungi. It is also known as dote or rot.

0.19 CROSS-BREAK. A "compression failure" is a deformation of the fibers due to excessive compression along the grain. It usually takes the form of buckling or crushing of the fibers.

0.20 COMPRESSION FAILURE. A "compression failure" is a deformation of the fibers due to excessive compression along the grain. It usually takes the form of buckling or crushing of the fibers.

0.21 LOW DENSITY WOOD. "Low density wood" means that wood which is exceptionally light in weight for its species, due usually to abnormal growth condition. It frequently breaks with a brittle fracture.

SECTION 1 - GENERAL

1.1 Except where either permanent or temporary stairways or suitable ramps or runways as required by this code are provided, ladders shall be provided to give access to all floors or to scaffolds or platforms where work is being performed more than five (5) feet above ground or to a permanent or temporary floor. This requirement may be waived, where other acceptable means of access has been provided, as to needle beam scaffolds or floats as used in steel construction.

1.2 Ladders as required by this code shall be left in place until the permanent or temporary stairways are provided and ready for use, and such stairways shall be erected when a building or piece of construction has reached a point sixty (60) feet above the ground.

1.3 The following types of commercially manufactured ladders shall comply with American Standard Safety Code for Fixed Ladders (A14.3-1956) and American Standard Safety Code for Portable Wood Ladders (A14.1-1959) or the latest revision thereof: (a) Portable ladders; (b) Extension ladders; (c) Portable stepladders; (d) Sectional ladders; (e) Trestle and trestle extension ladders. Essential data for their use by the building contractor is included therein.

1.4 Ladders which are to remain as a part of the permanent structure after completion of building operations shall conform to any local, state or municipal codes which may be applicable.

SECTION 2 - WOOD SIDE RAILS

2.1 Wood side rails shall be made from Eastern spruce, Sitka spruce, or approved equivalent. Material should be seasoned, straight-grained wood, free from shakes, checks, decay, or other defects which will impair its strength. Low density wood should not be used.

2.2 Side rails shall be dressed on all sides, sharp edges eliminated, and free from splinters.

2.3 All knots shall be sound and hard, and material containing loose knots shall not be used. They shall not appear in the narrow face of the rail and when in the wide face, shall be not more than one-half (1/2) inch in diameter, and shall not be within one-half (1/2) inch of the edge of the rail or nearer than three (3) inches to a thread or rung.

2.4 Pitch pockets not exceeding one-eighth (1/8) inch wide, two (2) inches long and one-half (1/2) inch in depth are permissible in wood side rails provided that not more than one (1) appears in each four (4) feet of length.

SECTION 3 - RUNGS, STEPS, OR CLEATS

3.1 Rungs and cleats shall be made of white ash, oak, or hickory, or other approved wood of equal strength. Wood steps shall be made of wood permitted for side rails. They shall be made from thoroughly seasoned material, free from shakes, pitch pockets, injurious checks, knots, decay, or other defects, and shall not be made from low density wood.

3.2 Cross grain in rungs, cleats, and steps shall not be allowed.

3.3 A uniform step spacing shall be used, which shall not exceed twelve (12) inches.

3.4 Wood rungs shall be inserted in holes bored in the side rails, which holes shall extend through the side rails.

3.5 The rungs shall extend through and flush with the outside face of the rail.

3.6 All holes for rungs shall be located on the center line of the wide face of the side rails.

3.7 The size of the hole shall be such as to ensure a driving fit for the rung.

3.8 The shoulder or round wood rungs shall be forced firmly against the side rail and the tenon secured in place by nails, care being taken to avoid splitting the tenon.

3.9 Wood threads shall be inset in the side rails not less than three-sixteenths (3/16) of an inch, fastened thereto by nails or screws, and further secured by braces, bolts, tie rods, or the equivalent.

3.10 Wood cleats shall be housed into the edges of the side rails not less than one-half (1/2) inch, or filler blocks used instead of housing, and the cleats shall be nailed to each rail with three (3) 10d wire nails, or fastened with through bolts.

3.11 Metal rungs shall be made of solid round steel rods, standard steel pipe or angle sections and securely fastened to the side rails by riveting, bolting, or welding.

3.12 Metal treads shall be flanged downward not less than two (2) inches at each end and secured to each side rail by two (2) bolts or rivets. Safety type treads may also be used with angle supports at each end.

3.13 All bolts and rivets shall have a close fit in the holes prepared to receive them.

SECTION 4 - CLEAT LADDERS

4.1 A single-section cleat ladder more than thirty (30) feet in length shall not be used.

4.2 Cleats shall be of the material used for side rails, straight-grained and free from knots, and shall be housed into the face of side rails one-half (1/2) inch, and fastened with nails or through bolts.

SECTION 5 - PORTABLE LADDERS

5.1 Portable ladders more than thirty (30) feet in length shall not be used.

5.2 All portable ladders shall be built with spread side rails. The width between side rails at the base shall in no case be less than eleven and one-half (11 1/2) inches for ladders up to and including ten (10) feet in length. For longer ladders this width shall be increased at least one-quarter (1/4) inch for each additional foot of length.

SECTION 6 - TABLES OF MATERIAL SIZES - WOOD LADDERS

6.1 Minimum sizes for wood side rails are given in Table 4.

6.2 Minimum sizes for rungs and cleats are given in Table 5.

TABLE 4 MINIMUM SIZES FOR WOOD SIDE RAILS

Length of Ladder (Feet)	Rung Type	Ladder	Cleat	Ladder
	Thickness	Depth	Thickness	Depth*
	Inches	Inches	Inches	Inches
Up to and including 19	1 1/8	2 1/2	1 5/8	3 5/8
Over 19, up to and including 23	1 1/8	2 5/8	1 5/8	3 5/8
Over 23, up to and including 25	1 1/8	2 3/4	1 5/8	3 5/8
Over 25, up to and including 27	1 1/4	2 3/4	1 5/8	3 5/8
Over 27, up to and including 30	1 1/4	2 7/8	1 5/8	3 5/8
Over 30, up to and including 33	1 5/16	3		

*Finished sizes are shown; 1 5/8 x 3 5/8 (2 x 4 stock size) is minimum permitted for cleat ladders.

TABLE 5 MINIMUM SIZES FOR RUNGS AND CLEATS

Length (inches) (Inches)	Rungs		Cleats	
	Center	Tenon	Thickness	Width
	Diameter (Inches)	Diameter (Inches)		
Up to and including 24	1 1/8	7/8		
Over 24, up to and including 32	1 3/16			
Up to and including 20			25/32	3
Over 20, up to and including 30			25/32	3 3/4

SECTION 7 - FIXED LADDERS

7.1 Fixed ladders shall have parallel sides of either wood or metal.

7.2 Fixed ladders shall be firmly secured in place by top, bottom and intermediate fastenings as required.

7.3 When fixed ladders are spliced, the splice plates shall be the same depth as the side rails.

7.4 The length of splice plates for metal or wood side rails shall be four (4) times the depth of the side rail. If of metal, they shall be not less than one-fourth (1/4) of an inch in thickness and chamfered on all exposed edges. If made of wood, they shall be not less than one (1) inch thick and six (6) times depth of side rail in length.

7.5 Splice plates shall be secured by bolts or rivets with the heads counter-sunk or of the button type.

7.6 The heads shall be on the outside of the rail.

7.7 The bolts or rivets shall be not less than one-half (1/2) inch nor more than five-eighths (5/8) inch in diameter.

7.8 The bolt ends shall be chamfered with only the chamfered end extending beyond the nut.

7.9 Both ends of the rivet shall be button shape.

7.10 Washers shall be placed under the nuts and rivet ends on wood side rails.

7.11 There shall be a minimum of three (3) bolts or rivets on each side of the joint for metal side rails and a minimum of four (4) bolts or rivets for wood side rails.

7.12 Bolts and rivets in both metal and wood side rails shall be staggered in position.

7.13 The pitch of a fixed ladder shall not be such that a man's position is below the ladder when climbing.

7.14 The distance from front of rungs to nearest permanent object on the climbing side of the ladder shall be not less than thirty (30) inches, and the distance from back of rungs to the building or structure to which it is fastened shall be not less than six and one-half (6 1/2) inches.

7.15 The fastenings shall be made of material equivalent in strength to the side rails and of sufficient length to allow the minimum distance between building and rung of ladder as mentioned in rule 7.14.

7.16 There shall be a width of at least fifteen (15) inches across the front of the ladder from center to center of rails.

7.17 The maximum distance between fastenings or braces shall not be in excess of ten (10) feet for ladders over fifteen (15) feet in length.

SECTION 8 - PORTABLE STEPLADDERS

8.1 Portable stepladders over twenty (20) feet in length shall not be used.

8.2 Stepladders shall be so constructed that when in the open position the front section shall have a minimum slope of three and one-half (3 1/2) inches and the back section a minimum slope of two (2) inches for each twelve (12) inch length of side wall. There shall be a spread at the bottom between the front and back section equal to at least five and one-half (5 1/2) inches for every foot of length of ladder.

8.3 Stepladders shall be so constructed that when in the open position all treads shall be level.

8.4 The minimum width between side rails at top step, inside to inside, shall be not less than twelve (12) inches with a spread of at least one (1) inch for each foot of length of stepladder.

8.5 A locking device or spreader to hold the front and back sections securely in open position shall be an integral part of each stepladder. This device shall have all sharp metal points removed or covered to protect the user.

8.6 The steps of stepladders shall not be made of material having knots exceeding one-half (1/2) inch in diameter.

8.7 All metal parts shall be malleable iron, wrought iron, or steel.

8.8 Each step shall be reinforced by a metal tie rod or a metal brace.

SECTION 9 - EXTENSION LADDERS

9.1 No extension ladder exceeding sixty (60) feet in length when extended shall be used.

9.2 No extension ladder shall have more than two (2) sliding sections.

9.3 Each sliding section shall be equipped with a metal shackle and pulley, raised and lowered by means of a rope, and shall be equipped with two (2) automatic locks of an approved type.

9.4 Locks and guide irons shall be of such construction as to make the extension ladder equal in strength to a ladder of equal length constructed of continuous side rails.

9.5 All parts of the lock shall be malleable iron, steel, or other approved material, except the spring and bushing which shall be of non-corrodible material.

9.6 All other metal parts of the ladder shall be of malleable iron, wrought iron, steel, or other approved material.

9.7 Frayed or badly worn rope shall not be used on extension ladders.

SECTION 10 - TRESTLE AND EXTENSION TRESTLE LADDERS

10.1 Trestle ladders over twenty (20) feet in length shall not be used and the base section or extension section of extension trestle ladders over twenty (20) feet shall not be used.

10.2 Trestle ladders and base section of extension trestle ladders shall be so spread that the width of the trestle at the bottom, inside to inside, is equal to or greater than five and one-half (5 1/2) inches per foot of length of ladder.

10.3 The bearings shall consist of rungs not less than one and one-quarter (1 1/4) inches in diameter, with seven-eighths (7/8) inch tenons mortised into the side rails at least seven-eighths (7/8) inch, or of oval bars not less than three-quarters by two (3/4 x 2) inches mortised into the side rails.

10.4 Bearings shall be spaced not more than eighteen (18) inches apart on centers.

10.5 Bearings shall be equivalent in strength and construction to rungs of other ladder.

10.6 The minimum distance between side rails of trestle ladders and the extension section of trestle ladders shall be not less than twelve (12) inches.

10.7 The spread of the side rails for trestle and base of extension trestle ladders shall be not less than one (1) inch per foot of length of ladder.

10.8 The extension section shall have parallel side rails.

10.9 The tops of side rails of trestle and base sections of extension trestle ladders shall be cut on a bevel to prevent them from spreading.

10.10 A locking device or spreader to hold the front and back sections securely in an open position and each pair of side rails rigidly parallel to one another shall be an integral part of each ladder.

10.11 The locking device for securing the extension section to the base shall be of an approved design.

10.12 All metal parts shall be of malleable iron, wrought iron, steel, or other approved material.

SECTION 11 - SECTIONAL LADDERS

11.1 The over-all length of a sectional ladder shall not exceed thirty-one (31) feet.

11.2 The bottom and intermediate sections shall not exceed a length of six (6) feet and four (4) inches and the top section shall not exceed a length of nine (9) feet.

11.3 The connection joint shall be not less than one (1) foot and shall fit closely without binding or unnecessary play.

11.4 Each grooved end of the sections shall be reinforced with a metal plate of not less than No. 18 U. S. gauge metal properly secured thereto, and a rivet above the groove extending through the depth of the rail.

11.5 Sectional ladders may be made up of sections having spreading sides, in which case they will not be interchangeable in their position in the ladder, or they may be made up of interchangeable sections with or without a top section having converging rails and a bottom section having flaring or spreading side rails.

11.6 The top section having converging side rails shall have a width at the top of not less than four (4) inches.

11.7 Rungs shall be not less than one and one-eighth (1 1/8) inches in diameter with seven-eighths (7/8) inch tenons mortised into the side rails at least seven-eighths (7/8) of an inch and spaced not more than twelve (12) inches apart center to center.

SECTION 12 - MANHOLE LADDERS

12.1 Manhole ladders more than twenty (20) feet in length shall not be used.

12.2 The rung spacing of a manhole ladder shall not exceed fifteen (15) inches.

12.3 The side rails of a manhole ladder shall be parallel and have a minimum inside width between the rails of twelve (12) inches.

12.4 The side rails and rungs of a manhole ladder shall be made of mild steel or other metal or equivalent strength.

SECTION 13 - ROOF LADDERS

13.1 Roof ladders shall be constructed with either metal or wood side rails and rungs, and to conform to the specifications for fixed ladders (See Sec. 7, page 127).

SECTION 14 - CAGE

14.1 A cage or basket guard shall be placed on all permanently fixed external ladders more than twenty (20) feet in length.

14.2 The cage shall extend from a point seven (7) feet above the base to the top of the ladder with the bottom flared out not less than four (4) inches.

14.3 Cages shall be of metal, substantially built and securely fastened to the ladder. The inside shall be clear of projections.

14.4 The cage shall be not less than twenty-four (24) inches in width and shall project not less than twenty (20) inches nor more than twenty-four (24) inches from face of ladders.

SECTION 15 - LANDINGS

15.1 Where landing platforms are provided at the top of ladders such landing shall be not less than twenty-four (24) inches in width, and provided with guardrails except in those sections which give access to the ladders.

15.2 Where fixed ladders are used to ascend to heights exceeding thirty (30) feet, landing platforms shall be provided for each thirty (30) feet or section thereof, and the ladder sections shall be offset, each from the other,

15.3 Where the installation condition requires offset sections of ladders, the sections shall be joined by the landing platform.

15.4 Fire ladders and fixed ladders provided with cages may be excepted from this requirement.

15.5 The side rails of fixed ladders shall extend at least three and one-half (3 ½) feet above the roof or landing platform, and the upper end shall be goose-necked, unless other convenient and secure hand holds are provided at such places. The rungs shall be omitted from this extension.

15.6 The side rails of all portable ladders shall extend not less than three and one-half (3 ½) feet above the platform or floor served, and the landing rung shall be at the level or above the floor or platform. The rungs above the platform should be omitted.

15.7 When a ladder is used to gain access to a roof and the employee must step a greater distance than eighteen (18) inches from ladder to roof, a landing platform shall be provided, and the top rung shall be above such landing.

15.8 The top rung of any section of fixed ladder shall be at the level or above the adjacent landing platform.

15.9 All landing platforms shall be equipped with standard railings so arranged as to give safe access to the ladder.

SECTION 16 - CARE AND USE OF LADDERS

16.1 When portable ladders are used, they shall be inclined so that the horizontal distance from the foot of the ladder to a plumb line dropped from the upper point of support is approximately one-fourth (1/4) of the

ladder length from the base to the upper point of support. In case of necessity, where a ladder is placed more nearly vertical, it shall be fastened to prevent tipping. If placed more horizontal, it shall be braced to prevent sagging.

16.2 Portable ladders shall be so placed that the side rails have a secure footing. The top rest should be rigid and have ample strength to support the applied load and the top of the ladder should be nailed or otherwise securely fastened to prevent movement

16.3 If a ladder is to be placed against a window frame, a board shall first be spiked across the side rails at the top.

16.4 Separate ladders for ascending and descending should be provided in building construction of more than two (2) stories in height, or where traffic is heavy.

16.5 Where it is necessary to install a ladder wide enough to permit traffic in both directions at the same time, a center rail shall be provided. One side of the ladder should be plainly marked "up" and the other side "down".

16.6 Ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction shall not be used. When ladders with such defects are discovered they shall be withdrawn from service and marked for repair or destruction.

16.7 Single portable ladders over thirty (30) feet in length shall not be used. If greater heights are to be reached, separate ladders shall be used and intermediate landing platforms provided.

16.8 Ladders made by fastenin~ cleats across a single rail shall not be used.

16.9 Single short ladders shall not be spliced together to provide long sections.

16.10 A stepladder shall never be used as a working platform.

16.11 Ladders shall not be placed or used in elevator shafts or hoistways, except where used by workmen engaged in work within such shafts or hoistways, and then they shall be protected from objects falling from operations at higher elevations in or adjoining the shaft.

16.12 Portable ladders, where used on smooth floors or other smooth surfaces, shall be equipped with non-slipping bases, or otherwise secured to prevent displacement.

16.13 Ladders shall not be painted. They may be preserved, if desired, with linseed oil, shellac, spar varnish, or other suitable transparent protective coating.

16.14 American Standard Safety Codes for: Portable Wood Ladders A14.1 - 1959; Portable Metal Ladders A14.2 - 1956; Fixed Ladders A14.3 - 1956 or any subsequent revisions thereof shall become and are hereby made a part of this code.

PART 12

HOISTS AND ELEVATORS

SECTION 1 - GENERAL

1.1 No person shall be permitted to ride in any hoist or elevator except when oiling and repairing guides, unless such elevator or hoist be constructed to comply with the requirements of Section 10.

1.2 When it is necessary for workmen to enter the cage or platform of any material hoist or elevator other than at the bottom landing, some locking device must be provided to prevent the cage or platform from being lowered while the workman is entering or leaving the cage.

NOTE: If an electrical signaling device is placed on the cage and this is the only method used to signal the hoisting engineer, the locking device may be omitted.

1.3 Hoists or elevators used for men or materials shall be operated only by competent and reliable men.

SECTION 2 - INSIDE MATERIALS - HOIST SHAFTWAYS

2.1 All material-hoist shaftways erected inside buildings shall be enclosed tightly for their entire height. When this is not practicable the sides of the shaftways not used for entrances shall be enclosed on each floor to a height of at least eight (8) feet with wire netting formed of not less than No. 16 U.S. Gauge wire, one and one-half (1 1/2) inch mesh, or enclosed with wooden slats spaced vertically set more than one and one-half (1 1/2) inches apart, with a toe board placed around all sides except at the entrance.

2.2 When two (2) material shaftways are erected side by side, similar protection shall be placed between them, except where enclosed cabs are installed as per rule 3.6.

2.3 All entrances into the shaftway shall be protected by hinged or pivoted bars or by gates.

2.3.1 If bars are used, they shall be not less than two by three (2 x 3) inches in section, placed at a height of not less than three (3) feet nor more than four (4) feet above the floor and located not nearer than two (2) feet from the shaftway.

2.3.2 The bar shall be bolted to one side of the enclosure frame by a single bolt on which the bar may swing, and a slot provided at the opposite side to receive the end of the bar when it is lowered to a horizontal position. A hook or wooden button shall be provided to hold the bar up out of the way while loading or unloading the hoist.

2.3.3 If a gate is used, it shall be located not more than six (6) inches from the front of the shaftway, at least five and one half (5 1/2) feet high, and the bottom not more than two (2) inches off the floor. Gates should be counter-weighted and equipped with a suitable locking or latching mechanism.

2.4 The guide rails of all hoists shall be kept rigid and in perfect alignment at all times.

2.5 The guide rails shall be of sound lumber or steel of adequate uniform size to provide a firm track.

2.6 Overhead sheave beams and their supports shall be of good sound timber or steel of strength and stiffness with a factor of safety of five (5) to support the combined live and dead loads imposed.

2.7 Protective covering of planking or heavy wire netting shall be provided above the overhead work of all hoists to prevent objects from falling down the shaftway.

SECTION 3 - MATERIAL - HOIST PLATFORMS

3.1 Material-hoist platforms shall be substantially constructed and of sufficient strength with a factor of safety of five (5) for the rated load and capacity.

3.2 Overhead protective covering of planking or heavy wire mesh shall be provided on the cross-head of every material-hoist platform to prevent objects falling on the workmen when loading or unloading the hoist.

3.3 The protection on the cross-head shall be made in sections and each section hinged, so they may be raised when hoisting long material.

3.4 When using a hoist for long material, the several pieces of the material shall be securely fastened together and made fast to the hoist so that no part of the load can fall or project beyond the sides of the hoist and get caught.

3.5 Suitable blocking and cleats shall be provided on all platforms when wheelbarrows or other rolling equipment are transported, to hold them securely in place.

3.6 The platform of every hoist shall be enclosed on the sides not used for loading or unloading, with toe boards and a heavy wire screen enclosure formed of No. 16 U.S. gauge wire, one and one-half (1 1/2) inch mesh.

3.7 Workmen shall not be allowed to ride on material hoists and a sign prohibiting such practice shall be posted on the crossbar of the platform or on the shaftway enclosure at each floor opening.

SECTION 4 - OUTSIDE HOISTING TOWERS

4.1 Material hoist towers erected outside of buildings shall be constructed of strong, sound material and of ample strength with a safety factor of five (5) to carry the loads intended.

4.2 Wooden members for the corner posts may be built up of two (2) inch laminated material. The wooden members, such as splice pads, braces, etc., may be bolted or nailed. No bolt less than one-half (1/2) inch in diameter shall be used.

4.3 Towers other than wooden towers may be used if equivalent strength is provided. (Tubular steel towers shall conform to regulations outlined in Section 5.)

4.4 Not more than two (2) diagonal braces shall be removed from any panel point in the tower and never from two (2) consecutive panels.

4.5 The diagonal cross bracing shall be placed on each of the four (4) sides of tower and between horizontal cross ties except at loading and unloading platforms, in which case some other bracing of equivalent strength shall be provided.

4.6 Foundations for hoist towers shall be sufficiently large to spread the hoist load so that it will not exceed the safe bearing capacity of the soil on which it stands. Foundations shall be level.

4.7 All splices in posts shall be not less than two (2) inches in thickness, four (4) feet long, and shall be spiked or bolted to at least two (2) adjacent sides of the posts. All splices shall be staggered.

4.8 Hoist towers shall be erected only by experienced men.

4.9 A strong ladder, securely fastened to the tower, shall extend its entire height. See PART 10, Section 7, "Fixed Ladders".

4.10 Hoist towers shall be securely guyed and well anchored.

4.11 The guys shall be securely clamped to "dead men" of sufficient size and well buried unless adequate building anchorages are available.

4.12 Platforms of ample size and strength, with railings and toe boards, shall be built at each level where men work.

4.13 Hoist towers shall be enclosed on all sides for their entire height with a wire screen enclosure formed of No. 16 U.S. gauge wire and one and one-half (1 1/2) inch mesh, securely fastened to the tower structure, with openings formed onto each floor level, properly protected.

4.14 The overhead framework of all towers shall be of sufficient strength to take the total load of all sheaves, car, and material to be hoisted, with a safety factor of five (5).

4.15 When extremely high hoist towers are to be erected, they shall be built in sections, by erecting the lower section to an altitude sufficient for immediate needs, and extending it upward when the construction work has progressed sufficiently to make it possible to provide a support or bracing for the tower.

4.16 Standard railing and toe boards shall be placed on the open sides of runways connecting the tower to the structure, and a bar or gate provided at all openings into the tower.

4.17 An enclosure of heavy wire mesh or wood slats shall be provided to prevent access to the space under any hoist platform.

4.18 The engineer shall be notified when any man goes up the tower ladder, or before any work is done on any part of the tower, overhead work, hoist, or in the pit.

SECTION 5 - HOISTING ENGINES

5.1 All gearing on hoisting engines shall be enclosed or suitably guarded. Steam piping shall be insulated and, if electrical equipment is used, it shall be effectively grounded.

5.2 Hoisting engines shall be of ample capacity and equipped with brakes capable of sustaining one hundred and fifty (150) percent of rated load for stopping and sustaining the maximum load in any position.

5.3 The hoisting engine and the engineer shall be protected against the weather and falling objects by a substantial covering.

5.4 All hoisting equipment shall be frequently inspected, and brakes, gears, and operating levers kept in perfect working condition.

5.5 Guards shall be provided where necessary to prevent persons coming in contact with hoisting cables.

5.6 Brake drums shall be kept free of oil or grease, or any substance which reduces their efficiency.

5.7 A pawl shall be used in addition to the brake to hold the load when it is suspended.

5.8 Hoisting engines shall not be set up in the street when it can be avoided, but if so located, they shall be completely housed-in for the protection of the public, the engine, and the operator.

5.9 Exhaust steam pipes shall discharge overhead or be piped to other safe discharging point, so as not to obstruct the view of the engineer or scald persons nearby.

5.10 In the operation of hoists, the operator shall always give a warning sign or signal before starting.

5.11 When hoisting machinery is set on an elevated platform, such platform shall be of substantial construction and guardrails and toe boards conforming to the rules in PART 12 of this code shall be provided along the open sides of the platform.

SECTION 6 - CABLES AND SHEAVES

6.1 All hoisting rope shall be not less than plow steel grade and shall be so constructed of wires and strands of wires as to be equal in flexibility to standard plow steel hoisting rope composed of six (6) strands of nineteen (19) wires each. No hoisting rope less than one-half (1/2) inch in diameter shall be used except for small winches as used on gin poles, etc., where three-eighths (3/8) inch rope may be used.

6.2 All hoist ropes shall be of such capacity as to provide a factor of safety, based on load and speed requirements, as indicated by the table below:

Speed FPM	Factor of Safety	
	Passenger Hoists	Material Hoists
50	7.50	6.67
100	7.85	7.00
150	8.20	7.32
200	8.54	7.64

6.3 No rope shall be used for the purpose of raising or lowering men or materials when more than ten (10) percent of the total wires are broken in any running foot of said rope, or when the wires on the crown of the strands are worn down to less than sixty (60) percent of their original area, or when, by superficial inspection, the rope shows marked signs of corrosion.

6.4 Rope fastenings shall be substantially and securely made and maintained. When fastened with clips, not less than three (3) such clips shall be used. All clips shall have the "U" side placed on the dead end of the rope. All sharp edges shall be prevented from coming into contact with the cable.

6.5 Minimum requirements for all sheaves shall be as given in the table below:

Diameter of Hoisting Rope (Inches)	Diameter of Sheaves (Inches)	Diameter of Axle (Inches)
1/2	12	1 3/16
5/8	14	1 7/16
3/4	16	1 11/16
7/8	18	1 15/16
1	20	2 3/16

Cage or Bucket Capacity up to	Height From Top Down (Feet)	Post Sizes (In.)	Guide S & S* Sizes (In.)	Horiz. Tie Size (In.)	Diag. Braces Size (In.)	Max. Tie Spacing (Feet)
500 lb.	Top to 72	4 x 4	2 1/2 x 3 1/2	1 x 6	1 x 6	6
500 lb.	72 to 198	4 x 6	2 1/2 x 3 1/2	2 x 6	1 x 8	6
1,000 lb. or 1/2 cu. yd.	Top to 72	4 x 4	3 1/2 x 3 1/2	1 x 6	1 x 6	6
1,000 lb. or 1/4 cu. yd.	72 to 126	4 x 6	3 1/2 x 3 1/2	2 x 6	1 x 8	6
1,000 lb. or 1/4 cu. yd.	126 to 198	6 x 6	3 1/2 x 3 1/2	2 x 6	1 x 8	6
2,000 lb. or 1/2 cu. yd.	Top to 80	4 x 6	3 1/2 x 3 1/2	2 x 6	1 x 8	8
2,000 lb. or 1/2 cu. yd.	80 to 128	4 x 6	3 1/2 x 3 1/2	2 x 6	1 x 8	8
2,000 lb. or 1/2 cu. yd.	128 to 208	6 x 6	3 1/2 x 3 1/2	2 x 6	2 x 6	8
4,000 lb. or 1 cu. yd.	Top to 80	4 x 6	3 1/2 x 3 1/2	2 x 6	2 x 6	8
4,000 lb. or 1 cu. yd.	80 to 128	6 x 6	3 1/2 x 3 1/2	2 x 6	2 x 6	8
4,000 lb. or 1 cu. yd.	128 to 208	6 x 8	3 1/2 x 3 1/2	2 x 8	2 x 6	8

NAILING SCHEDULE

	1 inch material	2 inch material
Diagonal Braces	5--8d	5--20d

SECTION 7 - ELECTRIC MOTORS

7.1 Motor installations shall be made in accordance with provisions of applicable local codes and the National Electrical Safety Code.

7.2 Enclosed switches and fuses shall always be used.

7.3 Switchboards shall be screened or enclosed and unauthorized persons warned to keep away from them.

SECTION 8 - CONCRETE BUCKET TOWERS

8.1 A concrete bucket tower located inside a structure and which is three (3) feet or less from any scaffold, or the edge of the shaftway, or floor opening in which it is installed, shall be enclosed on all sides with heavy wire netting formed of No. 16 U.S. gauge and one and one-half (1 1/2) inch mesh. Wood slats placed vertically and spaced not more than one and one-half (1 1/2) inches apart may be used instead of the netting. The enclosure shall extend at least eight (8) feet above such scaffold or floor.

8.2 A concrete bucket tower located outside a structure shall be enclosed for its full height with heavy wire netting formed of No. 16 U.S. gauge wire and one and one-half (1 1/2) inch mesh.

8.3 Openings with platforms shall be formed at each floor level, and the runway leading to the tower shall be guarded with railing and toe boards.

8.4 If the bucket is discharged into a chute, the chute shall be substantially constructed of wood or metal and extend from the tower to the point where the concrete is to be poured or transferred to vehicles or hoppers. The chute shall be substantially supported and pitched so that the concrete will flow by gravity.

8.5 The pit shall be drained and shall be deep enough so that any spillage from the bucket will fall below the blocking on which the bucket rests while being filled.

8.6 Men shall not be allowed to work in the pit without first resting the bucket on strong timbers supported on two (2) sides of the tower.

8.7 The bucket tower shall be securely guyed, at two (2) or more elevations as may be necessary.

8.8 The sheaves over which the cable passes shall be firmly secured to overhead sheave beams and supporting framework and the sheaves shall be kept well lubricated.

8.9 Every bucket hoist shall be provided with a broken rope type safety device.

8.10 A substantial platform provided with railing and toe boards shall be constructed near the top of the tower where the concrete is dumped into the chute and a strong ladder fastened to one side of the tower to enable a man to reach the platform in safety.

8.11 Workmen shall be prohibited from riding in the bucket.

SECTION 9 - SIGNAL SYSTEM FOR MATERIAL HOISTS

9.1 For Signal System see PART 8, "Derricks."

9.2 The signal code shall be posted adjacent to the signal device at each and every work level and at the operator's position.

9.3 All wording shall be black on white card in large clear letters.

SECTION 10 - WORKMEN'S ELEVATOR CARS

10.1 Workmen's elevators within a building, which are to be converted to permanent use after completion of the job, shall be constructed and equipped as required in American Standard A17.1-1960 Safety Code for Elevators, Dumbwaiters and Escalators including Supplement A17.1a-1963 except that hoistway enclosure, hoistway doors, car enclosure, door and gate locking devices, initial inspection and lubrication, and tests shall conform with the requirements of this article.

10.2 Elevators other than those set forth in above shall be approved.

10.3 Elevators shall be maintained in proper and safe operating condition. They shall be periodically inspected and lubricated as may be necessary for such maintenance. Necessary repairs or replacement of parts shall be promptly made. No elevator shall be loaded in excess of the load for which it is designed.

10.4 Every hoistway shall be enclosed on all sides to a height of at least 10 feet above the lowest landing level and on the sides facing car entrances or the building or structure, throughout its height except entrance openings.

10.5 The hoistway enclosure shall be made of expanded metal of at least No. 16 U.S. gauge or other incombustible material equivalent in strength and rigidity when properly installed. Openwork metal enclosures shall reject a 1 ½ inch diameter ball. The enclosure shall be so installed and reinforced that a horizontal pressure of 100 lbs. against any point will not cause a deflection greater than one inch nor reduce the running clearance below the required minimum.

10.6 Every entrance opening in the hoistway enclosure shall be provided with a solid door which shall extend across the full width of the opening and which shall be provided with a vision panel securely covered with wire mesh. It shall be provided with a lock or latch which shall be operable from the hoistway side only and inaccessible from the landing side. Such

door shall be at least 78 inches high and shall have an under-clearance of not more than $\frac{1}{2}$ inch.

EXCEPTION: The door at the lowest landing shall be provided with means accessible only to designated persons to unlock it from the landing side.

10.7 In normal service every hoistway door shall be latched or locked shut except when in use for passage to or from the car and no person except the car attendant shall open such door.

10.8 Doors shall be securely reinforced and hung to provide adequate durability.

10.9 All sides except landing sides shall be provided with substantial and tight enclosures at least 6' high. The top of the car shall be covered with tight material equivalent in strength to 2" planking and shall have an opening with a hinged hatch-cover not less than 18" in its smallest dimension and not less than 400 square inches in area.

10.10 Each landing side of the car shall be provided with a door or gate at least 6' high and of construction equivalent in strength to that of the car enclosure. Every opening in the door or gate shall be of such size and shape as to reject a 3" ball at any point. The car shall be equipped with an approved electrical contact so arranged that the car cannot be operated unless each door or gate is shut.

10.11 Wiring and other electrical equipment shall be of proper quality and properly installed. Installations in accordance with the National Electrical Code may be presumed to comply herewith. Hoistway wiring may consist of heavy duty rubber-covered traveling cable. All wiring and other electrical equipment which may be exposed to the weather shall be weatherproof.

10.12 Inside the car at each landing, means for artificial lighting shall be provided. The inside of the car, all landings and the space occupied by hoisting machines shall at all times be properly lighted.

10.13 There shall be no thoroughfare through or under any hoistway.

10.14 The top of the hoistway shall have a weathertight enclosure. The space occupied by the hoisting machine shall be similarly enclosed and where the operator is stationed at the hoisting machine the enclosure shall be heated in cold weather.

10.15 No car shall be operated in service unless it is in the charge of a designated person stationed in the car as its attendant.

10.16 Before each installation of a workmen's elevator it shall be thoroughly inspected and subjected to trial runs by a designated person experienced in the installation of such equipment.

10.17 After erection and before use, every elevator shall be tested. The test shall be made by a designated person and shall be performed as follows:

1. The car shall be loaded to maximum carrying capacity and run

at least twice to both limits of travel to test the action of the speed governor, the operation of the upper automatic limit devices and the operation of the hoisting machine brake at various levels of the hoistway.

2. With such load in place, the car safeties shall be made to actuate with the car traveling downward at a speed slightly greater than that for which the elevator is designed.
3. Such test shall be repeated at least once every month while the elevator is in use on the job.
4. A complete written report of every test including the date, the test loads and speeds involved and the test results shall be kept on the job for use by the Commissioner. The report shall be signed by the person making the test.

SECTION 11 - PROTECTION FOR EMPLOYEES WORKING IN ELEVATOR SHAFTS

11.1 When men are working in an elevator shaftway, hatchway, or stairwell during the construction, demolition, or alteration of any structure, a protection shall be provided not more than two (1) stories above nor more than one (1) story below the level at which the men are working. Such protection shall be of planks not less than two (2) inches thick, laid across the opening.

11.2 A wire netting enclosure at least eight (8) feet high, formed of not less than No. 16 U.S. gauge wire, one and one-half (1½) inch mesh, or of vertical wood slats spaced not more than one and one-half (1½) inches apart, shall be installed around an elevator or hoist shaftway below the lowest landing to prevent access to the space under the platform.

PART 13

TEMPORARY FLOORS, STAIRS, RAILINGS, AND TOE BOARDS

SECTION 0 - DEFINITIONS

0.1 FLOOR OPENING. The term "floor opening" when used in this code shall mean an opening in any floor, platform, or pavement, twelve (12) inches or more in its least dimension.

0.2 FLOOR HOLE. the term "floor hole" when used in this code shall mean an opening in any floor, platform, or pavement, less than twelve (12) inches but more than one (1) inch in its least dimension.

0.3 WALL OPENING. A "wall opening" when used in this code shall mean an opening in any wall or partition having a height of at least thirty (30) inches and a width of at least eighteen (18) inches.

0.4 PLATFORM. The term "platform" when used in this code shall mean a working space for persons, equipment, or materials, elevated above the surrounding floor or ground, having a length of more than five (5) feet and a width of more than two (2) feet.

0.5 RUNWAY. A "runway" is a passageway for persons, elevated above the surrounding floor or ground, having a length of more than five (5) feet but a width of not more than two (2) feet.

0.6 STAIR RAILING. A "stair railing" is a vertical barrier erected along exposed sides of stairways to prevent falls of persons.

0.7 HANDRAIL. A "handrail" is a single bar or pipe on brackets from a wall or partition to furnish persons with a handhold in case of tripping, as on stairways and ramps.

0.8 TOE BOARDS. A "toe board" is a vertical barrier at floor level erected along exposed edges of floor openings, wall openings, platforms, runways, and ramps to prevent falling of materials.

SECTION 1 - TEMPORARY FLOORING

1.1 In buildings or structures of skeleton steel construction, the permanent floor filling, or the floor-filling forms, except for temporary shaftway openings, shall be installed as the erection progresses, and there shall be not more than eight (8) stories of erected steel above the uppermost permanent floor filling,

1.2 A temporary plank floor shall be provided not less than two (2) tiers below the tier of beams on which bolting, riveting, welding, or painting is being done, and at every other floor level at which the permanent floor filling or the floor-filling forms have not been provided. Such temporary floor shall cover the entire tier of beams except for such places as are required for access to the ladders and stairways and for hoisting purposes. The planks for such temporary floor shall be free from protruding nails and splinters, and shall be not less than two (2) inches in thickness for a span up to and including ten (10) feet. The planks shall be laid close together, supported on a solid bearing, and securely fastened to the framework of the structures.

1.3 In buildings or structures having wood floor construction, rough flooring shall be laid on each tier of joists as the structure progresses, and the floor next below where any work is being performed shall be entirely floored over? except for such spaces as are required for access to ladders and stairways and for hoisting purposes. Such rough flooring shall consist of boards not less than seven-eighths (7/8) inch in thickness.

1.4 In non-fireproof buildings where stair halls or other floor areas of fireproof construction are to be provided, floor arch forms shall be installed as the work progresses, which shall be not more than two (2) stories below the story on which any brickwork or masonry is being

1.5 Planks used for temporary floors shall be clean planks, free from nails and splinters, and not less than two (2) inches stock thickness on a span up to ten (10) feet.

1.6 Planks shall be laid close together with all ends over a solid bearing to prevent tipping, and the ends overlapped at least four (4) inches.

1.7 When planking is removed, all loose objects lying on the planks shall first be removed to prevent such objects falling on persons below.

1.8 In buildings or structures of wood joist floor construction, the under-flooring shall be laid on each tier of joists as the structure progresses, or if double floors are not to be used, the tier of joists next below where such work is being performed shall be entirely floored over except for such spaces as are required for ladders and shaftways. The temporary flooring shall consist of boards not less than seven-eighths (7/8) of an inch thick.

1.9 There shall be frequent and careful inspections of all temporary flooring and other false work to be sure that it is always maintained in safe working condition.

1.10 All defective materials or unsafe conditions discovered by the workmen shall be immediately corrected.

SECTION 2 - STAIRS AND STAIRWELLS

2.1 In all buildings, permanent stairways shall be installed as soon as working conditions will permit.

2.2 When work on a building has progressed to a height in excess of sixty (60) feet above the grade, and it has not been practicable to install the permanent stairways, one temporary stairway, at least, shall be provided for the entire height of the structure, continued up as the work progresses, and shall remain in place until the permanent stairways are installed.

2.3 All temporary stairs shall be so constructed as to be able to support safely a load of one hundred (100) pounds per square foot of tread and landing surface.

2.4 Temporary stairs shall be so constructed that the treads and risers are of uniform width and height in any one flight.

2.5 Temporary stairs shall be not less than forty (40) inches

2.6 Intermediate floor landings on temporary stairs shall be not less than thirty (30) inches deep.

2.7 No flight of temporary stairs shall have an unbroken vertical rise of more than twelve (12) feet.

2.8 All temporary stairs shall be adequately lighted.

2.9 When temporary stairs are enclosed, no door shall open directly on the stairs, but there shall be a landing of a width equal to at least the width of the door between the door and stairs.

2.10 Stairway landings which are not enclosed shall be considered as platforms and shall be guarded with standard railings as defined in

rules 3.2 and 3.3 on the exposed open side.

2.11 Whenever temporary railings or enclosures are removed for the purpose of handling materials or the installation of other work, they shall be immediately replaced upon the completion of such work.

2.12 On permanent stairways designed and installed with steel treads and landings to receive cement or other filling material, temporary wooden treads shall be laid in the full width of the tread and landing to the height of the nosing, firmly fitted in, and secured in place.

2.12.1 Such wooden treads shall be free from protruding nails and splinters and shall be replaced when any part of same is worn below the height of the nosing.

2.13 Permanent stairways shall be protected with railings or enclosures as mentioned above for temporary stairways, as soon as installed, and such protection maintained until the permanent railings or enclosures are erected.

2.14 Any stairway rising steeper than fifty (50) degrees from horizontal will be considered a ladder and shall conform to the provisions of Part 10.

2.15 Every flight of stairs having four (4) or more risers shall be equipped with a stair railing or handrail as specified in Section 4.

2.16 Stairways not more than forty-four (44) inches wide and enclosed on both sides shall have at least one (1) handrail located on the descending side.

2.17 Stairways not more than forty-four (44) inches wide and having one (1) open side, shall have a stair railing along the open side.

2.18 Stairways not more than forty-four (44) inches wide, and having both sides open, shall have a stair railing along each side.

2.19 Stairways more than forty-four (44) inches wide shall have a handrail along each enclosed side with a stair railing along each open side.

2.20 Stairways eighty-eight (88) inches or more in width shall be provided with a center rail.

SECTION 3 - STANDARD RAILINGS

3.1 Where it is desired to secure more detailed and specific information in connection with railings and toe boards, reference should be made to American Standard Safety Code for Floor and Wall Openings, Railings, and Toe Boards (ASA A12-1932), published by the American Standards Association.

3.2 Wherever required by this code, a standard railing or guard-rail shall consist of a top rail, an intermediate rail, and upright supports.

3.3 Wherever required by this code, a standard railing shall have a vertical height of not less than thirty-six (36) inches nor more than

forty-two (42) inches from the floor or platform to the upper surface of the top rail. The intermediate railing shall be midway between the floor or platform and the underside of the top rail.

3.4 All railings shall be constructed in a substantial manner, of wood, metal pipe, angle iron, or other metal shapes, the use of cable as guardrails and handrails must be avoided whenever possible.

3.5 Posts or uprights shall be spaced not more than eight (8) feet apart, center to center.

3.6 The anchoring of the posts to the floor or platform and the framing of the rails shall be of such construction that the railing will be capable of withstanding a live load of twenty (20) pounds per linear foot applied either horizontally or vertically downward on the top rail. A handrail shall be of similar strength.

3.7 A handrail shall consist of a single member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail.

3.8 The length of handrail brackets shall be such as will give a clearance between handrail and wall or any projection of at least one and one-half (1½) inches. The spacing of brackets shall not exceed eight (8) feet.

3.9 Instead of the intermediate rail, the protection between the top rail and the toe board or floor may be of wire netting formed of No. 16 U.S. gauge wire having one and one-half (1½) inch mesh.

3.10 A toe board shall be required in conjunction with a handrail or guard rail where there is danger of material or objects falling on persons below.

SECTION 4 - WOOD RAILINGS

4.1 The top rail shall be formed of at least two by four (2 x 4) inch stock, the intermediate rail of at least two by two (2 x 2) inch stock, and the upright of at least two by four (2 x 4) inch stock. The top rail shall be smooth surfaced throughout its entire length, free from splinters, and the ends of the rail shall not overhang the terminal posts or uprights where such overhang would constitute a projection hazard.

4.2 The anchoring of the posts to the floor or platform, and the framing of the rails, shall be of such construction that the railing will be capable of withstanding a load of two hundred (200) pounds applied in any direction at any point of the top rail. A handrail shall be of similar strength.

4.3 Light wood rails or scantlings resting on barrels or boxes or other makeshift supports shall not be set up or used as guardrails.

4.4 A stair railing shall be of construction similar to a standard railing, but the vertical height shall be not less than thirty-three (33)

inches nor more than thirty-nine (39) inches from the tread at the face of the riser to the top surface of the rail.

4.5 A handrail shall consist of a single member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail.

4.5.1 The length of brackets shall be such as will give a clearance between handrail and wall or any projection of at least one and one-half (1½) inches. The spacing of brackets shall not exceed eight (8) feet. The handrail shall be of hard wood, at least two (2) inches in diameter or of such section as will furnish an adequate handhold for anyone grasping it.

4.6 All railings shall be constructed of good, sound material, free from large or loose knots, and all stock smooth-surfaced.

SECTION 5 - PIPE RAILINGS

5.1 The posts or upright supports and top rails shall be of metal pipe at least one and one-quarter (1¼) inches inside diameter, and the intermediate rail of metal pipe at least one (1) inch inside diameter. The spacing of posts or uprights shall not exceed eight (8) feet.

SECTION 6 - STRUCTURAL METAL RAILINGS

6.1 The posts or uprights and top rails shall be of angle iron at least one and one-half by one and one-half by three sixteenths (1½ x 1½ x 3/16) inches or other metal shapes of equivalent bending strength, and the intermediate rail of angle iron of at least one and one-quarter by one and one-quarter by one-eighth (1¼ x 1¼ x 1/8) inches or other metal shape equivalent bending strength. The spacing of posts or uprights shall not exceed eight (8) feet. The anchoring of the posts or uprights shall be as specified in rule 4.2.

6.2 Instead of the intermediate rail, the protection between the top rail and the toe board or floor may be of wire netting formed of No. 16 U.S. gauge wire having one and one-half (1½) inch mesh.

SECTION 7 - TOE BOARDS

7.1 Wherever required by this code, a standard toe board shall be at least five and one-half (5½) inches in vertical height from the floor, platform, ramp, or runway to the top edge of the board.

SECTION 8 - FLOOR AND WALL OPENINGS

8.1 As soon as the opening is framed, all floor or roof openings within a building or other structure during the course of construction, alteration, or repairing shall be covered with planks so as to carry safely any load which may be required to be supported thereon, or shall be fenced in on all sides by a standard railing.

8.2 Every floor hole into which persons can accidentally walk

shall be guarded either by a standard railing and toe board on all exposed sides, or a cover of sufficient strength to safely support any load which may be placed thereon. While the cover is not in place, such holes shall be constantly attended by someone or shall be protected by a portable enclosing rail that need not be of standard construction.

8.3 WALL OPENINGS. Every wall opening or hole shall be guarded if its lower edge is either: (a) on the inside, three (3) inches or less above floor level, (b) on the outside five (5) feet or more above ground or floor level.

8.3.1 The guard shall be either a standard railing and toe board, or standard railing with an enclosing screen of either solid construction or grille or slat work with openings or not over one (1) inch in width.

The screen may be omitted where the falling-material hazard is negligible in the opinion of the proper administrative authority.

SECTION 9 - OPEN-SIDED FLOORS, PLATFORMS, AND RUNWAYS

9.1 Every open-sided floor shall be guarded by a standard railing on all open sides, five (5) feet or more above the adjacent floor or ground level except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toe board wherever, beneath the open sides: (a) Person can pass, (b) There is moving machinery, (c) There is equipment with which falling materials could create a hazard.

9.2 Wherever materials have to be regularly passed over the edge of the floor the intermediate rail may be omitted and a section of the railing made removable or a section omitted entirely if, in the opinion of the proper administrative authority, regular operating conditions made a railing wholly impracticable.

9.3 Every platform as designed in this code shall be guarded by a standard railing. The railing shall be provided with a toe board wherever, beneath the open sides, persons can pass or machinery and equipment are exposed to the hazard of falling material.

9.4 Every runway (5) feet or more above floor ground level shall be guarded by a standard railing on all open sides. Wherever tools, machine parts, or materials are likely to be used on the runway, a toe board shall also be provided on each exposed side.

9.5 Runways used exclusively for special purposes (such as oiling, shafting, or filling tank cars) may have the railing one side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a width of runway not less than eighteen (18) inches.

9.6 Every inclined runway, where erected for the use of workmen, shall be provided with cleats not more than sixteen (16) inches apart to prevent slipping.

PART 14

HOUSEKEEPING, TEMPORARY WIRING AND
LIGHTING, PERSONAL PP~OTE.CTIVE

EQUIPMENT, ETC.

SECTION 1 - HOUSEKEEPING

1.1 All stairways, passageways, and gangways shall be kept free from materials, supplies, and obstructions of every kind.

1.2 Materials and supplies shall be kept away from the edges of hoistways, stairways, floor openings and, when the exterior walls are not built, away from the outside of the building.

1.3 Loose or light material shall not be left lying about on floors or roofs that are not closed in, unless safely secured.

1.4 Bolts, nuts, or rivets shall be collected daily and placed in kegs or other suitable receptacles,

1.5 Tools should not be strewn about where they may cause tripping or other hazard, and should, at the end of each work shift, be collected and stored in the tool shed or other place provided for their storage when not in use.

1.6 Bags containing lime, cement, and other dust-producing material shall be covered and protected against damage by moisture.

1.7 When protruding nails are found in boards, planks, and timbers, they shall be removed, hammered in, or bent over flush with the

SECTION 2 - TEMPORARY WIRING AND LIGHTING

2.1 Adequate light shall be provided throughout the building and in all work areas throughout the project, particularly passageways and stairways, and wherever necessary to avoid a hazard due to lack of light. Artificial illumination, if required, shall be such that its intensity is not less than ten (10) foot candles.

2.2 Electric lamps that burn continuously throughout the working period shall be inspected daily, and all broken or burned-out lamps immediately replaced by new ones.

2.3 Whenever artificial lighting is provided, lamps shall be so placed and shaded that they will not affect the safety of the workmen by producing glare or deep shadows, or insufficient lighting.

2.4 Lamps shall be protected against breakage by wire guards.

2.5 All temporary electric wiring shall be so installed that it cannot be damaged when materials are moved as construction progresses.

2.6 Where two or more voltages are used on the same job, all electrical equipment and circuits shall be properly identified.

2.7 All electric wiring, apparatus, and equipment shall be installed in accordance with all applicable regulations and the National Electrical Safety Code.

2.8 All wiring panels and other temporary electric equipment shall be maintained in safe condition,

SECTION 3 - DISPOSAL OF WASTE MATERIAL

building.

3.1 All scrap lumber, waste material, and rubbish resulting from the building construction shall be collected and removed, stored in neat piles, and not left to accumulate and be a hazard to employees or others. If chutes are used for their removal, they shall be built and used to conform to the requirements of PART 1, Section 4 on "Chutes".

3.2 When waste material or rubbish is stored within the building, it shall be so placed as not to overload the floor construction and where it will not endanger workmen,

3.3 Waste material and rubbish shall never be thrown from upper levels to lower levels or to the ground. Waste lumber shall be tied in bundles and lowered by means of ropes or tackle.

3.4 No waste material shall be disposed of by burning within the

SECTION 4 - TEMPORARY SANITATION

4.1 Adequate toilet facilities, maintained in clean sanitary condition, shall be provided for the workmen, located within easy access to their place of work. Facilities shall be provided from the start of the operation and connected to the sewer as soon as the same is available and running water provided.

4.2 Every toilet shall be so constructed that the occupants are sheltered from view and protected against the weather and falling objects. Every toilet shall also be provided with natural or artificial illumination and shall be maintained in a clean and sanitary condition.

4.3 On high buildings, facilities shall be so installed as soon as practicable that at no time will the workmen be obliged to travel more than four (4) stories to reach them.

4.4 When the building is four (4) stories or less in height, facilities may be provided outside the building but should be not more than one hundred (100) feet distant.

4.5 A sufficient quantity of disinfectants or deodorizers shall be supplied and frequently used as necessary to keep the closets in a clean, sanitary condition.

4.6 The installation of all plumbing facilities shall conform to the regulations of the health and other local authorities having jurisdiction in the locality where the construction work is being performed.

4.7 Adequate washing facilities with running water shall be provided for the workmen located within a reasonable distance of the place of work.

4.8 A clean, safe enclosed place shall be provided in which workmen may make change of clothing.

4.9 An adequate supply of pure drinking water shall be provided for the workmen during hours of employment and connection shall be made to the municipal water supply when such is available. Individual drinking cups or an approved type of drinking fountain shall be provided.

4.10 Before water is used from wells or other local sources for drinking purposes, it shall be tested and approved by state, municipal, or other recognized authorities.

SECTION 5 - PERSONAL PROTECTIVE EQUIPMENT

5.1 Head protection. Every employee required to pass or work within areas where there is danger of being struck by falling objects or materials shall be provided with an approved safety hat.

5.2 Boots. Every employee required to work in water, wet concrete or other wet footing shall be provided with waterproof boots with safety insoles.

5.3 Waterproof clothing. Every employee required to work in rain or similar wetting conditions shall be provided with a waterproof coat and hat.

5.4 Corrosive substances. Every employee required to use or handle corrosive substances shall be provided with appropriate protective apparel.

5.5 All personal protective equipment shall be kept clean and in good repair. Before being transferred from one employee to another, safety hats, foul weather hats, boots and hat or boot liners shall be washed or dry cleaned so as to be clean and sanitary.

5.6 Goggles, glasses, respirators and welders' shields shall be sterilized before being transferred from one employee to another.

SECTION 6 - SALAMANDERS

6.1 Salamanders where used as heating apparatus, shall not be set directly upon wooden floors or other combustible supports, but

shall rest on beds of earth or ashes at least three (3) inches in thickness, or on heavy metal plates well insulated from the floors. Salamander legs shall rest on the insulation, and the insulation shall extend beyond the salamanders at least two (2) feet on all sides.

spaces.

6.2 Salamanders shall not be set up and used in unventilated

6.3 Salamanders shall be provided with a sheet metal hood and a sheet metal pipe extended from the hood to the outside air to carry off the fumes of combustion, except as provided in rule 6.4.

6.4 Small salamanders that are moved from place to place and where piping is not practicable shall only be placed in a room that is ventilated by at least one (1) window opening or ventilated in some other effective manner.

6.5 Salamanders shall be kept at least two (2) feet and six (6) inches away (in horizontal direction) from wooden partitions, temporary wooden construction, or other combustible material which can cause fire. There shall be at least six (6) feet overhead clearance.

6.6 When salamanders are used in the vicinity of tarpaulins or canvas covering they shall be located at least ten (10) feet away and the tarpaulins securely fastened to prevent their blowing toward the salamanders.

SECTION 7 - SAFETY NETS, BOATS, LIFE LINES AND SAFETY BELTS

7.1 Rope nets, safety belts, or equivalent protection, shall be provided for men exposed to the hazard of falling who are working on bridges twenty-five (25) feet or more above the ground or water level.

7.2 Where employees are exposed to hazard of falling into the water in which one may drown, there shall be provided at all times during the exposure, equipment for promptly rescuing persons from the water, including a manned and properly equipped boat where necessary.

7.3 Except where, in the opinion of the superintendent in charge, their use creates a greater hazard, life lines and safety belts shall be provided for and used by workmen engaged in securing or shifting thrust-outs, inspecting or working on overhead machines supporting scaffolds or other high rigging and on steeply pitched roofs. Similarly, they shall be provided for and used by all workmen exposed to the hazard of falling, and by painters at work on poles or steel-frame construction more than fifteen (15) feet above solid ground or above a temporary or permanent floor or platform.

7.4 Every life line and safety belt shall be of sufficient strength to support, before breaking, a weight of twenty-five hundred (2,500) pounds.

7.5 Only the best grade Manila rope shall be used for life lines.

7.6 Every life line and safety belt shall be inspected by the superintendent or his authorized representative before it is used, and at least once a week while continued in use thereafter.

7.7 Life lines shall be equipped, at intervals not exceeding six (6) feet, with rings to which workmen may attach their belts.

7.8 Life lines, when in use, shall be safely secured to strong, stable supports.