

5-21-1970

# Construction Safety Rules and Regulations Fifth Edition 1969

Maine Department of Labor and Industry

Maine State Board of Construction Safety Rules and Regulations

Follow this and additional works at: [http://digitalmaine.com/bls\\_docs](http://digitalmaine.com/bls_docs)

---

## Recommended Citation

Maine Department of Labor and Industry and Maine State Board of Construction Safety Rules and Regulations, "Construction Safety Rules and Regulations Fifth Edition 1969" (1970). *All Bureau of Labor Standards Documents*. Paper 262.  
[http://digitalmaine.com/bls\\_docs/262](http://digitalmaine.com/bls_docs/262)

This Text is brought to you for free and open access by the Bureau of Labor Standards at Maine State Documents. It has been accepted for inclusion in All Bureau of Labor Standards Documents by an authorized administrator of Maine State Documents. For more information, please contact [statedocs@maine.gov](mailto:statedocs@maine.gov).

M L12.6: Co 652/969  
c1



LIBRARY USE ONLY

STATE OF MAINE

Construction Safety Rules and Regulations

FIFTH EDITION

1969

STATE BOARD OF CONSTRUCTION SAFETY

RULES AND REGULATIONS

Maine DEPARTMENT OF LABOR AND INDUSTRY,

Augusta, Maine 04330

Board of  
Construction  
Safety

DLI Bulletin No. 25-9

Published under Appropriation No. 1155



The code contained in this booklet is formulated and adopted by the Board of Construction Safety Rules and Regulations under Sections 371 to 374, Title 26, Maine Revised Statutes.

The provisions of this code do not apply to construction for self use where the number of persons engaged for hire, or by virtue of a contract, does not exceed 5. (26 M. R. S. A., Section 371, subsection 4)

MAINE STATE BOARD OF CONSTRUCTION SAFETY RULES  
AND REGULATIONS

Representing the construction contractors—

JAMES VIOLETTE, Waterville

FRANK ROSSI, Gardiner

Representing the construction workers—

ERNEST KIMBALL, Orrington

KENNETH WORMELL, Bangor

Representing the insurance companies—

ALBERT C. HODSON, Portland

Representing the public—

WESTON S. EVANS, Orono

Commissioner of Labor and Industry—

MARION E. MARTIN (*Chairman*)

Insurance Commissioner—

FRANK M. HOGERTY, JR.

*Secretary*

GEORGE L. BATES,

Department of Labor and Industry



**STATE OF MAINE**

**Construction Safety Rules and Regulations**

**FIFTH EDITION**

**1969**

**STATE BOARD OF CONSTRUCTION SAFETY**

**RULES AND REGULATIONS**

**DEPARTMENT OF LABOR AND INDUSTRY**

**Augusta, Maine 04330**

**DLI Bulletin No. 25-9**

**Published under Appropriation No. 1155**

MY 21 '70

## I N D E X

### BLASTING

Drilling .....	68
Firing .....	70
General .....	64
Handling Explosives .....	67
Inspection After Blasting .....	71
Loading .....	68
Misfires .....	71
Wiring .....	69

### DEMOLITION

Floors, Removal of .....	79
General .....	73
Materials, Removal of .....	79
Passageways, stairs and ladders .....	77
Preparatory steps .....	76
Storage areas .....	81
Walls, Removal of .....	78

### ELECTRICAL SAFETY DURING CONSTRUCTION .....

93

### ELEVATORS—CONSTRUCTION

Cables and sheaves .....	53
Engines and motors .....	53
General .....	48
Shafts and Towers .....	51

### EXCAVATION

General .....	29
---------------	----

FIRST AID .....	42
-----------------	----

GENERAL RULE .....	6
--------------------	---

### GUARD RAILS AND TOEBOARDS

REQUIRED .....	19
----------------	----

### HEAVY EQUIPMENT AND TRUCKS

General .....	35
Maintenance and use .....	35
Trucks .....	35
Cranes, shovels, and backhoes .....	36



Operation in proximity to overhead utility lines .....	38
HOUSEKEEPING .....	40
<b>LADDERS</b>	
Extension .....	25
Fixed .....	24
General .....	21
Portable .....	24
Sectional .....	27
Side Rails .....	23
Splices .....	23
Steps, Rungs and Cleats .....	22
Stepladders .....	26
Trestle and extension trestle .....	27
PERSONAL PROTECTION EQUIPMENT ....	83
POISONOUS, HOT, OR OTHER HARMFUL SUBSTANCES .....	45
<b>POWDER ACTUATED TOOLS</b>	
Definitions .....	56
General .....	57
Handling Tools .....	62
Operation and limitations of use .....	61
Power loads .....	63
Tool Design .....	58
High velocity type .....	58
Piston tools—low velocity type .....	59
Power assisted hammer drive tools .....	60
PROTECTION OF THE PUBLIC .....	86
RAMPS AND RUNWAYS .....	20
<b>STAGING AND SCAFFOLDING</b>	
Boatswain's chairs .....	14
Crawling boards or chicken ladder .....	17
Enclosed for protection .....	9
Float scaffold .....	14
General .....	5
Guard Rails .....	19

Horse Scaffold .....	15
Inside Scaffold .....	16
Jack Scaffold .....	18
Ladder Jack Scaffold .....	15
Pole Scaffold .....	9
Heavy duty .....	11
Light duty .....	10
Protection on pitched surfaces .....	18
Roof bracket scaffold .....	17
Special purpose scaffold .....	15
Stilts .....	7
Swinging and suspended scaffold .....	12
Heavy duty .....	13
Light duty .....	13
Wall bracket scaffold .....	17
<b>STATUTES .....</b>	<b>5</b>
<b>WELDING AND CUTTING .....</b>	<b>91</b>
General .....	91
Electric arc welding .....	91
Gas welding and cutting .....	92
<b>WIRE ROPE AND SHEAVES .....</b>	<b>95</b>
<b>WORK AROUND WATER .....</b>	<b>90</b>



## STATUTES

### **Applicable section of Sec. 44, Title 26, R. S. 1964 as amended**

#### **"Sec. 44. Right of access**

The commissioner as state factory inspector, and any authorized agent of the department, may enter any \* \* \* \*, construction activity, \* \* \*, when the same are open or in operation, for the purpose of gathering facts and statistics such as are contemplated by sections 42 to 44, and may examine into the methods of protection from danger to employees and the sanitary conditions in and around such buildings and places, and may make a record of such inspection."

### **Applicable section of Sec. 45, Title 26, R. S. 1964 as amended**

#### **"Sec. 45. Notice of improper conditions**

—If the commissioner or any authorized agent of the department shall find, upon inspection of construction activities, that conditions of the activity are in violation of the rules and regulations and so as to be dangerous to employees working at or near them, he shall notify immediately the contractor or person in charge of such activity to make alterations or additions consistent with the rules and regulations by him deemed necessary for the safety and protection of the employee. Such notice shall be served personally upon the contractor or the person in charge of the activity, or in cases of obvious or extreme hazard where immediate action is necessary to preserve life and limb and where the contractor or person in charge of such activity is not readily accessible, he may conspicuously affix a written notice or tag to the object or device or the part thereof declared to be unsafe. After such notice has been served or affixed, all persons shall cease using until the object or device, or part thereof, is altered or strengthened in such a manner as to provide safe conditions. The inspector shall make every effort to notify immediately the contractor or person in charge of such activity before undertaking such action."

STATUTES

**Applicable sections of Sec. 46, Title 26, R. S. 1964 as amended**

**"Sec. 46. Failure to cooperate or comply**

—Whoever refuses to admit or unreasonably delays the commissioner or any authorized agent of the department in entering any \* \* \* construction activity, \* \* \* referred to in section 44 for the purpose of carrying out said section 44, or refuses to give the information required by said commissioner or authorized agent, shall be punished by a fine of not more than \$100 or by imprisonment for not more than 90 days, or by both.

Any proprietor, owner or agent of any \* \* \* construction activity, \* \* \* described in section 44, who fails to make the alterations or additions required by the commissioner as state factory inspector or any authorized agent of the department \* \* \* within such time as said alterations or additions can be made with proper diligence, shall be punished by a fine of not less than \$25 nor more than \$200, or by imprisonment for not more than 30 days, or by both."

**GENERAL RULE**

**General rule applying to all construction sections:**

Any equipment or condition not specifically covered by these rules and regulations and which might cause immediate personal harm shall be made reasonably safe as provided by Title 26, Sec. 45, R. S. 1967, as amended.



## PART A: STAGING AND SCAFFOLDING

### Section 1. General.

A 1.1 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. Scaffolds constructed in accordance with this code shall be provided for workmen engaged in work that cannot be done safely from the ground, from solid construction or from stilts, except such short-period work as can be done safely from ladders.

A 1.1a Stilts may be used only under the following conditions: (1) On the inside of buildings; (2) On sound clean floors; (3) In such other conditions as are not hazardous or unsafe, and would not subject the wearer to undue accidents or injuries; (4) They shall not exceed 24" in height; (5) The feet shall be of rubber or other non-slip and non-conductive material; (6) They must be insulated against electrical hazards; (7) They must be of sufficient strength to support a minimum of 300 pounds; (8) The foot rest must be secure and free from play, of sufficient size to give a secure base, and the user's shoes should be securely fastened thereto.

A 1.1.b The use of a commercially manufactured device consisting of a basket or bucket suspended from a hydraulically operated boom mounted on a motor vehicle, which device is commonly referred to as a "cherry picker" or "sky bucket" shall be considered as complying with this rule.

A 1.2 The basic factor determining the adequacy and safety of all scaffolding shall be standard structural analysis in accordance with good engineering practice and accepted material strengths and safety factors.

A 1.3 The materials used in the construction of scaffolding shall be of good quality and free of defects which impair their strength or suitability for the

purpose intended. Items of material which become weakened, worn, split, frayed, or damaged shall not be used. Throughout this code it shall be understood that items of equivalent or greater strength or adequacy may be substituted for any item mentioned. Sizes of lumber referred to are in all cases nominal dimensions.

A 1.4 In wooden scaffolding no nails smaller than 8d shall be used and a sufficient number of nails shall be used to carry the designed load. Nails shall be driven in full length except double-headed nails which shall be driven tightly to the guard head.

A 1.5 Platforms: The working platforms of scaffolding shall normally be built of planks of a type commonly referred to as "staging planks." Because of its light weight and high strength, Eastern Spruce shall be the standard material for staging planks. If Eastern Spruce is unavailable, Southern Pine or Douglas Fir or equally desirable lumber for staging use may be substituted. The use of native hemlock and white pine is prohibited.

A 1.6 Planks shall be of first quality lumber, free of knots, shake or other flaws which would impair their strength for the use intended. When Eastern Spruce is used it shall be "#1 Merchantable" grade or better. When Douglas Fir is used it shall be "Select Structural" grade or better. When Southern Pine is used it shall be "Dense Structural 65" grade or better. They shall be unsurfaced and except for special cases shall conform to the standard nominal dimensions of 2 inches by 10 inches by 16 feet.

A 1.7 Prior to use, planks shall be tested by having two men standing close together at the middle of the plank, spring it up and down while the plank is supported at each end 10 inches above the ground.

A 1.8 Planks in use should be laid close together and shall be lapped over bearers if more than one length is used. The ends shall not be left unsupported more than 12 inches.



**A 1.8a** The term laid close together shall mean edge-to-edge except that on scaffolds used for ceiling work, planks may be laid not more than 18 inches apart.

**A 1.8b** The width of the scaffold platforms shall be as follows: (Plank shall be considered the standard staging plank, 2" x 10" nominal dimension) (1) For use by painters and decorators—1 plank; (2) For use for men and tools only, and where the platform is not more than 6 feet in height—2 planks; (3) For use for men and tools only, and where the platform is more than 6 feet in height—3 planks; (4) Where used for men, materials and tools only —5 planks, and (5) Where used for men, materials, tools and vehicles—6 planks.

**A 1.9** If plank is not used, material such as plywood, boarded staging ladders or other strong, light materials capable of safely supporting the designed loads shall be used.

**A 1.10** Scaffolding shall be divided into two classifications:

*Light Duty*—Scaffolding designed and constructed to carry a working load of twenty-five pounds per square foot such as intended for the use of carpenters, painters, and similar trades and a reasonable amount of light-weight materials.

*Heavy Duty*—Scaffolding designed and constructed for a working load of fifty pounds per square foot such as intended for the use of masons or others which supports in addition to the workmen a reasonable supply of building materials.

**A 1.11** Where a scaffold is enclosed for protection against the elements (using tarpaulin, plastic, or other similar materials) the scaffold shall be securely tied to resist a minimum wind load of 15 pounds per square foot of vertical projection.

## **Section 2. Pole Scaffolding**

**A 2.1** General:



A 2.1.1 All pole uprights shall be set up plumb, and the scaffolding so fastened and braced as to prevent its swaying.

A 2.1.1a The bracing on pole scaffolding shall at least consist of X braces on the end panels (between ledgers) and diagonal racking braces on the outside of each panel, parallel with the wall of the structure, to prevent sway. The use of lean-to or push-pole bracing shall not be permitted.

A 2.1.1b Where it is required to splice scaffold poles, rule H 2.7 shall apply.

A 2.1.2 No scaffolding post shall stand directly on the ground, but shall be centered and secured on a footing or foundation of sufficient size and strength to spread the load from the post on a sufficient area to prevent settlement. For heavy duty scaffold the minimum considered sufficient shall be 144 square inches or more in area and shall be not less than eight (8) inches wide and of strength equal to a 2" spruce plank. For light duty scaffold the minimum shall be not less than 100 square inches and not less than eight (8) inches wide.

A 2.1.3 Where necessary as a protection against the impact of trucks or other heavy equipment, the bases of scaffolding shall be protected from displacement by bumpers not attached to the scaffold.

#### Single Pole, Independent Pole and Built Up Scaffolding

##### A 2.2 Light Duty:

A 2.2.1 For light duty scaffolding not more than 24 feet in height, the following minimum nominal size material is required:

Poles or uprights	2 x 4 inches
Ledgers supporting bearers	1 x 6 "
Stringers not supporting bearers	1 x 6 "
Bearers	4 x 4 " or
	2 x 6 " on edge

Braces	1 x 4	“
Planking	2 x 10	“
Toeboards	1 x 6	“
Guard Rails	2 x 4	“

Spacing of Poles—

Measured along the platform  
not to exceed 7 ft. - 6 in.

Distance from building  
not to exceed 5 ft. - 0 in.

Spacing of ledgers (vertically) 7 ft. - 0 in.

A 2.2.2 For light duty scaffolding more than 24 feet in height and not more than 60 feet in height, the pole shall be 3 x 4 inches in cross-section and for such scaffolding more than 60 feet in height 4 x 4 inches in cross-section or heavier as required to support a working load of 25 pounds per square foot.

A 2.3 Heavy duty:

A 2.3.1 For heavy duty scaffolding not more than 60 feet in height, the following minimum nominal size material is required:

Poles, uprights	3 x 4 inches	
	or 2 x 6	“
Ledgers supporting bearers	1 x 8	“
Stringers not supporting bearers	1 x 6	“
Bearers	4 x 4	“
	or 2 x 8	“ on edge
Braces	1 x 6	“
Planking	2 x 10	“
Toeboards	1 x 6	“
Guard Rails	2 x 4	“

Spacing of Poles—

Between poles not to exceed 7 ft. - 6 in.

Distance from building  
not to exceed 6 ft. - 0 in.

Spacing of ledgers (vertically) 4 ft. - 6 in.

A 2.3.2. For heavy duty scaffolding more than 60 feet in height and not more than 100 feet in height



the pole shall be 4 x 4 inches in cross-section and for such scaffolding more than 100 feet in height 4 x 6 inches in cross-section or heavier as required to support a working load of 50 pounds per square foot.

A 2.4 Tubular pole scaffolding shall be of a design and manufacture approved by the Department of Industrial Cooperation at the University of Maine, Underwriters' Laboratories, Inc., or other recognized authority and shall be used only for the purposes and loadings for which they are recommended by the manufacturer and shall be used in accordance with his instructions.

The scaffolding shall be supported on a firm foundation. When used on wheels or casters made especially for this purpose, the maximum height without being secured to a solid structure shall not exceed three times the width of the base. When used on legs, the maximum height without being secured to a solid structure shall not exceed four times the width of the base. For any ratios of height to width beyond these limits the scaffold shall be so secured as to prevent its swaying or rolling.

A 2.4.1 The working platform of portable scaffold shall be secured against sliding.

### **Section 3. Swinging and Suspended Scaffolding**

#### **A 3.1 General:**

A 3.1.1 Wire suspension ropes shall be used if the ropes are exposed to open flame, welding or burning equipment, or acid.

A 3.1.2 Repealed November 5, 1969.

A 3.1.3 The outside of platforms shall be protected with a guard rail and an intermediate guard rail capable of withstanding a force of 200 pounds applied in any direction. The outside of platforms shall also be provided with a toeboard at least 6 inches high.

### **A 3.2 Light Duty Suspended Scaffolding:**

This type of scaffolding shall consist of a light platform supported at the ends by hangers attached to blocks and falls fastened securely at an elevated point.

The ropes in the blocks and falls shall not be less than  $\frac{5}{8}$  inch manila rope properly rigged into a set of standard blocks consisting of at least one double and one single block or a staging machine of standard manufacture equipped with  $\frac{1}{4}$  inch wire rope. Each end of the scaffold platform shall be supported by a metal hanger equivalent in strength to one made of steel  $\frac{3}{4}$  inch in diameter. These hangers shall be formed with a horizontal bottom member to support the platform; shall be provided with means to support a guard rail, and an intermediate guard rail or rope; and shall have a loop or eye at the top for securing the supporting hook on the block.

Cleats or other devices shall be provided to locate the hangers at a distance not exceeding 1 foot from the end of the platform and to prevent them from sliding. While in use the platform of a swinging scaffolding shall be lashed or secured to hold it in position and prevent swaying from the building.

**A 3.2.1** The supporting hooks or roof irons shall be of structural steel or wrought iron not less than seven-eighths ( $\frac{7}{8}$ ) of an inch in diameter, or of equivalent strength, and secured to a safe anchorage at all times.

### **A 3.3 Heavy Duty Suspended Scaffolding:**

This type of scaffolding consists of a platform of a width suitable for masonry or other heavy work



and is designed in accordance with Heavy Duty requirements. The platform is supported by scaffold machines suspended on wire ropes attached to outriggers secured to the upper portion of the structure. The scaffold machines and outriggers shall be of a design and manufacture approved by the Underwriters' Laboratories, Inc., or the Department of Industrial Cooperation at the University of Maine and shall be used in accordance with the manufacturer's instructions. The outriggers shall be spaced to safely support the platform and shall be carefully blocked and secured with the standard U bolt connection or other equally strong method. The platform planks shall be not less than 2 inches thick laid close together and shall overlap the bearers at least 12 inches.

#### A 3.4 Boatswain's Chairs

The chair shall be a solid plank not less than 2 feet long by 1 foot wide by 1 inch thick. The chair shall be supported by a sling of  $\frac{5}{8}$  inch manila rope or equivalent. The sling shall be a single rope passing through 4 holes near the corners of the seat in such a manner that the rope crosses underneath the seat and the ends of the rope shall be spliced or securely knotted together. The sling shall be securely attached to a suspension line of 1 inch manila rope properly rigged, or blocks and falls with not less than  $\frac{5}{8}$  inch manila rope or  $\frac{1}{4}$  inch wire rope.

#### A 3.5 Float Scaffolding:

Float scaffolding shall consist of a platform of planks or plywood attached to two cross timbers projecting sufficiently from under the platform to permit securing suspension ropes to them. The cross timbers shall not be less than 2 x 4 inches in cross-section. The four supporting ropes shall be  $\frac{3}{4}$  inch manila rope for platforms not exceeding 4 feet x 6 feet and shall be securely fastened to an adequate overhead support. No less than  $\frac{5}{8}$  inch plywood is acceptable in lieu of standard staging plank.



A 3.5.1 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.

### A 3.6 Needle Beam Scaffolding:

Needle beam scaffolding shall be made of wooden or metal beams supporting a platform. The beams shall be suspended by manila ropes at least 1 inch in diameter securely fastened to an adequate overhead support. The needle beams shall be in one piece and shall be 4 inches wide by 6 inches deep for spans of up to twelve feet between supports. Longer needle beams shall be provided with intermediate supports or be of greater cross-section. The rope shall be attached to the beam so that the beam will be prevented from rolling or turning and provisions made to prevent the ropes from slipping over the end of the beam.

A 3.6.1 Needle beam scaffolds shall be used only for the support of men doing riveting and other light work, and shall not be used for the storage of materials.

## Section 4. Special Purpose Scaffolding

A 4.1 General: Except as otherwise provided herein all special purpose scaffolding shall conform to the strength and material requirements established in Section 1.

### A 4.2 Horse Scaffolding:

Horses used for scaffolding purposes shall be rigid and of solid construction. The following minimum nominal size materials or their equivalents shall be used in a horse 4 feet long.

Bearers	4 x 4 inches or 2 x 6 inches
Legs	1 x 6 inches
Gusset brace at top of legs	1 x 8 inches

If the horse is longer or higher than 4 feet, the size of the members shall be increased accordingly.

Horse scaffolding shall not be erected more than three tiers of horses high. The first tier of horses shall be set on a solid level foundation, and not directly on the ground. Subsequent tiers shall be placed directly over the horses in the tier below.

**A 4.2a** When horses are tiered, the height of the working platform shall not exceed 16 feet.

**A 4.2b** Where a single horse is to be used as a temporary working platform or used alternatively for either a temporary working platform or as the bear for a horse scaffolding, the bearer of the horse shall not be smaller in dimension than the standard staging plank or 2 x 10 inches nominal size.

#### **A 4.3 Inside Scaffolding:**

This type of scaffolding shall consist of trestle ladders or horses supporting staging planks. Trestle ladders shall be opened to full spread before laying on the planks. Single ladders leaning against a wall shall not be used to support planks. Ladders used on slippery or sloping surfaces shall be secured against slipping.

#### **A 4.4 Ladder Jack Scaffolding:**

Ladder jack scaffolding shall not be used at a greater height than 22 feet above the ground or floor surface. Only one person shall work on a ladder jack scaffolding at any one time. The ladder jack shall be clamped or otherwise securely fastened to the ladder and shall bear on the side rails. Ladders used with ladder jacks shall be placed and secured to prevent slipping or settlement.

**A 4.4a** Ladder jacks may bear on the rungs of metal ladders or on the rungs of wooden ladders where such rungs are reinforced with metal rods extending through the side rails.



#### A 4.5 Roofing Bracket Scaffolding:

Roofing bracket scaffolding shall be triangular in shape of standard design and manufacture or formed with 3 pieces of 2 inch by 4 inch material. The diagonal member shall be sloped to fit the pitch of the roof and the horizontal member leveled to support the plank. The vertical leg shall project at least 3 inches above the horizontal member to prevent platform planks from slipping off the bearer. Roofing brackets shall be fastened by means of nails or pointed projectors driven their full length in the frame or woodwork of the roof or by means of ropes fastened to the roofing bracket on one end and on the other end to a hook securely hooked over the ridge pole or secured to chimney or roof members or other solid objects.

#### A 4.6 Wall Bracket Scaffolding:

Wood brackets shall be built of material not less than 2 inches x 3 inches, mortised together and bolted. Metal brackets are permitted if they are of equivalent strength. The supporting bolt shall be not less than  $\frac{5}{8}$  inches in diameter. It should be welded to a flat iron member, not less than two feet long, which should be bolted and set in flush with the top surface of the horizontal member. Length of bolt shall be sufficient to extend well inside the studs (when secured to a frame building) and shall be provided with a washer and lever-handled nut. There shall be at least 2 inches of threaded bolt beyond the nut when it is screwed up. The supporting bolt and nut shall be inspected frequently, and renewed when the threads show signs of wear. In erecting a bracket, a 2 x 4 inch block shall be laid horizontally across the inside of two studs and spiked in place. The supporting bolt shall pass through the block, and the nut shall be drawn up tight against it.

#### A 4.7 Crawling Boards or Chicken Ladders:

Crawling boards shall be at least 10 inches wide and not less than 1 inch thick. Cleats as long as

the width of the board and at least 1½ inches wide by 1 inch thick shall be securely nailed to the board at a distance not to exceed 16 inches apart. The board should be laid on the roof so that its length extends from the ridge pole perpendicularly. The upper end shall be securely anchored to the ridge pole with hooks, fastened with a cleat or hinged to another crawling board on the other side of the ridge pole.

A 4.8 The use of roof brackets, life lines, crawling boards, chicken ladders or other similar protection, consistent with the duration and condition of the work, shall be required on pitched surfaces where the pitch exceeds 3 inches in each horizontal foot of run. A foot lock and/or toeboard shall be required at the lower edge of all pitched surfaces to prevent the workers, material or tools from slipping over the edge.

#### A 4.9 Jack Scaffolds:

A 4.9.1 Adjustable scaffold jacks of standard design may be used to support scaffolds twelve feet (12') or less in height, provided that they are so placed upon the ground or upon a structural surface that the scaffold is supported at intervals of not more than twelve feet (12') and is firm and rigid.

Exception: When the total load on the scaffold (men, tools and material) does not exceed five hundred pounds (500 lbs.) the height may be increased to not over thirty-six feet (36') providing that: (1) no unbraced section of the scaffold pole or upright shall exceed twelve feet (12'); (2) if 2 x 4's are spliced to make up the pole or upright the splices shall be so constructed as to develop the full strength of the member; (3) the load shall not be concentrated on one plank.

A 4.9.2 All parts of every jack scaffold shall be so constructed as to bear four times the maximum weight dependent thereon.



A 4.9.3 Not more than two persons shall be permitted to be upon a jack scaffold, between any two supports, at one time.

## Section 5. Guard Rails or Ropes and Toeboards

A 5.1 Guard rails or ropes and toeboards shall be provided:

A 5.1.1 Along the exposed side of ramps, runways, platforms, scaffolding and other similar structures adjacent to sources of danger.

A 5.1.2 On the exposed open side of stairways and stair landings.

A 5.1.3 Around the open sides of all openings over 12 x 12 inches and around shafts and stair wells and the perimeter of floors about which side walls have not been erected.

A 5.2 Guard rails shall be placed at a reasonable height, not less than 36 inches nor more than 42 inches from the platform floor, and shall be supported by uprights in such a manner that the guard rail will withstand a load of 200 pounds applied in any direction.

A 5.2 Guard rails and guard ropes shall be placed at a reasonable height, not less than 36 inches nor more than 42 inches from the platform floor, and shall be supported by uprights in such a manner that the guard rail or guard rope will withstand a load of 200 pounds applied in any direction.

A 5.3 Toeboards shall be at least 6 inches in height and not less than 1 inch in thickness (nominal dimensions). Where material is piled above the height of the toeboard, screening shall be placed from the top of the toeboard to the bottom of the guard rail to prevent such material from falling through.

A 5.4 Guard rails, guard ropes and toeboards shall not be required where the distance from the platform to the ground or solid construction is less than 8



feet unless the scaffolding or other appurtenance as covered in this section is adjacent to some unusual source of danger.

**A 5.5** The use of guardrails, guard ropes and toe-boards shall not be required on float and needle beam scaffolding where such use increases rather than diminishes the hazard.

**A 6 Ramps and Runways:**

**A 6.1** The load-bearing members of ramps and runways and similar structures shall be substantially supported and securely braced to prevent excessive deflection, swaying, or shifting.

**A 6.2** Ramps and runways shall be not less than two 10-inch planks wide. Those used for rolling equipment shall be not less than three 10-inch planks in width.

**A 6.3** Ramps and runways used for foot traffic shall be inclined no more than 1 foot of rise in 3 feet of run, and under slippery conditions, where the rise exceeds 1 foot of rise in 5 feet of run, cleats spaced not more than 16 inches apart shall be attached to the top surfaces. Ramps and runways used for rolling equipment shall be inclined not more than 1 foot of rise in 4 feet of run.

**A 6.4** Planks shall be laid close together over a solid bearing and secured to prevent tipping, loosening, or displacement, with battens on the underside to prevent uneven deflection.

## PART B: LADDERS

### Section 1. General.

**B 1.1** When workers are required to gain access to surfaces more than 3 feet above or below the ground or other temporary or permanent levels, ladders of sufficient length shall be provided and maintained in place as long as necessary or until other acceptable means of access such as ramps or stairways are ready for use.

**B 1.2** The materials used in the construction of wooden ladders shall be sound, of good quality, straight grained and free of defects which impair its strength for the purpose intended. Eastern spruce or its equivalent is recommended. Ladders with weakened or broken or missing treads, rungs, or cleats or broken side rails shall not be used. Ladders which have developed weaknesses affecting the strength shall be taken out of service and repaired or discarded. Cleats shall not be used to repair rung ladders.

**B 1.3** The painting of wooden ladders is prohibited. Linseed oil, shellac or clear varnish coatings may be used. Striping or other marking for visibility is permissible.

**B 1.4** Access areas to ladders shall be kept clear of debris and other materials. Ladders shall not be used in passageways, driveways, shafts, hoistways, or other such thoroughfares unless properly guarded against displacement by barricades and from falling objects from operations at higher levels. Doors adjacent to portable ladders or which when opened interfere with the free passage up or down the ladder shall be locked or otherwise blocked while the ladder is in place and in use.

**B 1.5** If ladders are used where the public must pass underneath or near the base of the ladders or where they may be in danger from falling objects, proper safeguards shall be provided. Where possible, such



pedestrian or vehicular traffic shall be routed safely around the ladder.

**B 1.6** When ladders are used for access to surfaces more than two stories in height or when traffic is heavy, separate ladders for ascending and descending shall be provided. Where it is necessary to install one ladder wide enough to permit travel in both directions at the same time, a center rail shall be provided; one side shall be clearly marked "up" and the other side "down".

**B 1.7** Sloping ladders which require climbing on the under side of the ladder shall not be used.

**B 1.8** Ladders made by fastening cleats across a single rail are prohibited.

**B 1.9** The use of metal ladders within 10 feet of wires carrying electric currents of any voltage, is prohibited.

**B 1.10** Metal ladders and the metal parts used on ladders shall be equivalent to and shall maintain the strength and rigidity required of ladders by this code.

## **Section 2. Steps, Rungs, Cleats**

**B 2.1** A uniform step spacing shall be used which shall not exceed 12 inches.

**B 2.2** Cleats and steps shall be made of Eastern spruce or its equivalent. Rungs, cleats, or steps shall be straight grained, of seasoned material and free of defects. Wood rungs shall be not less than  $1\frac{1}{8}$  inches in diameter and shall extend through and flush with the outside face of the side rails. Holes shall be located on the wide face of the side rails.

**B 2.3** Cleats shall be no less than  $\frac{3}{4}$  inch by  $2\frac{3}{4}$  inches either rough or planed for ladders having a width of 20 inches or less between side rails and  $\frac{3}{4}$  inch by  $3\frac{5}{8}$  inches either rough or planed for ladders having a width of more than 20 inches between side rails.



**B 2.4** Wood cleats shall be housed into the side rails not less than  $\frac{1}{2}$  inch or filler blocks used instead of housing. Cleats shall be nailed to each rail with not less than three 8d wire nails or fastened through with bolts.

**B 2.5** Wood treads or steps shall be inset in the side rails not less than  $\frac{3}{16}$  inches, fastened thereto with nails or screws and further secured by braces, bolts, tierods, or equivalent.

**B 2.6** Metal treads shall be flanged downward not less than 2 inches at each end and secured to each side rail by two bolts or rivets. Safety type treads with angle supports at each end may also be used.

**B 2.7** Metal rungs shall be made of solid steel rods (round), standard steel pipe or angle sections and securely fastened to the side rails by riveting, bolting or welding.

### **Section 3. Side Rails**

**B 3.1** The width between side rails in rung ladders shall be not less than  $11\frac{1}{2}$  inches for ladders up to and including 10 feet in height and shall be increased by  $\frac{1}{4}$  inch for each additional foot of height (or length).

**B 3.2** Wood side rails for ladders shall be not less than 2 inches by 4 inches nominal dimension. The minimum width between side rails shall be 15 inches and the maximum width 30 inches for cleat ladders.

### **Section 4. Splices**

**B 4.1** Single ladders not constructed to be used as sectional ladders shall not be spliced together to form a longer ladder unless such splicing together will provide and maintain the strength and rigidity required for a longer ladder. The length of splice plates shall be not less than 4 feet, equally distributed above and below the joint.

## **Section 5. Portable Ladders**

**B 5.1** All portable ladders shall be of sufficient length and so placed that the workmen can reach the uppermost point at which work is to be performed without stretching or assuming a hazardous position. Workmen shall not stand on a point higher than the third rung from the top of the ladder.

**B 5.2** Single portable ladders of over 30 feet in length are prohibited. If greater heights are to be reached, separate ladders shall be used and intermediate landing platforms provided.

**B 5.3** When portable ladders are used, they should 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 ( $\frac{1}{4}$ ) 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 should be fastened to prevent tipping. If placed more nearly horizontal, it should be braced to prevent sagging. Supports both top and bottom shall be rigid, capable of supporting the loads to be imposed and of such a nature that lateral displacement cannot occur. Cleats, shoes, metal points, lashings, etc., shall be used when necessary.

## **Section 6. Fixed Ladders**

**B 6.1** Fixed ladders shall be secured by top, bottom, and sufficient intermediate fastenings to hold them rigidly in place and to support the loads to be imposed.

**B 6.2** Fixed ladders shall have parallel side rails at least 15 inches center to center for rails of single type ladder and at least 20 inches center to center for rails of the double type ladder.

**B 6.3** Vertical ladders shall have a clear distance of at least  $6\frac{1}{2}$  inches from the back of the rung, cleat



or tread to the nearest permanent object. Climbing clearance shall be at least 30 inches to the nearest obstruction.

**B 6.4** Fixed ladders, either vertical or sloping, shall ordinarily be securely fastened and braced at distances not in excess of 10 feet for ladders over 15 feet in height. Where the distance between fastenings or braces must exceed 10 feet, the ladder shall be specifically designed to meet the span requirements. Fastenings shall be of material equivalent in strength to the side rails and of sufficient length to allow the aforesaid clearances.

**B 6.5** Rails shall extend at least 36 inches above top landings. Rungs above the landing may be omitted if it is necessary to pass through the ladder. Landing platforms shall be provided where it is necessary to step a greater distance than 14 inches from the ladder to the nearest permanent structure to which the ladder is affixed.

**B 6.6** Landing platforms shall be provided for ladders of more than 30 feet in length at intervals of 30 feet or fractions thereof. The ladder sections shall be offset from each other and connected by the landing platform. The top rung of any section of fixed ladder shall be at the level of or above the adjacent landing platform. On tanks, stacks, or similar structures the offset provision does not apply.

**B 6.7** Landing platforms shall be not less than 24 inches in width and shall be provided with guardrails and handholes except in the sections giving access to the ladder.

## **Section 7. Extension Ladders**

**B 7.1** Frayed or worn rope shall not be used on extension ladders.

**B 7.2** Extension ladders shall be so constructed that when locked in any position, rungs of the overlap-



ping sections will be opposite each other and the ladder shall be of equal strength to one with continuous side rails.

**B 7.3** Extension ladders shall be raised vertically, locked, then placed at the same angle as single ladders.

**B 7.4** Extension ladders shall not have more than two sliding sections nor exceed 60 feet in length when fully extended. Such sections shall be equipped with metal guides, metal shackle and pulley and 2 locks of a standard type and shall be raised or lowered by means of a rope.

## **Section 8. Stepladders**

**B 8.1** Stepladders shall be so constructed that when opened and locked, the front section shall have a minimum slope of  $3\frac{1}{2}$  inches per foot and the back section a minimum slope of 2 inches per foot. When opened and locked the treads of the stepladder shall be level.

**B 8.2** Stepladders shall not be over 20 feet in length and the cap shall not be used as a working platform.

**B 8.3** A locking device or spreader to hold the front and back sections securely in open position shall be an integral part of any stepladder. The locking device shall be fully opened and locked in position before the ladder is used.

**B 8.4** Each tread or step shall be reinforced by a metal tierod or metal brace and the back section of the stepladder shall be crossbraced to provide a rigid frame.

**B 8.5** The minimum width between side rails at the top step, inside to inside shall not be less than 12 inches. The width at the bottom shall be wider than the width at the top by at least one inch for each foot of height.

## **Section 9. Sectional Ladders**

**B 9.1** The overall length of a sectional ladder shall not exceed 31 feet. The bottom and intermediate sections shall not be over 6 feet 4 inches long and the top section shall not exceed 9 feet in length.

**B 9.2** The connection joint shall not be less than 1 foot and shall fit closely without binding or unnecessary play.

**B 9.3** Rungs shall not be less than  $1\frac{1}{8}$  inches in diameter with  $\frac{7}{8}$  inch tenons mortised into the side rails at least  $\frac{7}{8}$  inch and spaced not more than 12 inches apart.

**B 9.4** The top section having converging side rails shall have a width at the top of not less than 4 inches.

**B 9.5** Each grooved end of the sections shall be reinforced with a metal plate of not less than #18 U.S. gage metal properly secured thereto and a rivet above the groove extending through the depth of the rail.

**B 9.6** Sectional ladders may be made up of sections with 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 spreading or flaring side rails.

## **Section 10. Trestle and Extension Trestle Ladders**

**B 10.1** Trestle and extension trestle ladders shall be used only as a support for scaffold planks.

**B 10.2** Trestle ladders shall be no longer than 20 feet; the extension and base sections of extension trestle ladders when fully extended shall not exceed 20 feet.

**B 10.3** Trestle ladders and the base sections of extension trestle ladders shall be so spread at the bot-



tom, inside to inside, that the width is equal to or greater than  $5\frac{1}{2}$  inches for each foot of height.

**B 10.4** The minimum distance between side rails of trestle ladders and the extension section of extension trestle ladders shall be not less than 12 inches.

**B 10.5** The spread of the side rails of trestle ladders and the base section of extension trestle ladders shall not be less than 1 inch per foot of height.

**B 10.6** The extension section of extension trestle ladders shall have parallel side rails.

**B 10.7** The tops of side rails of trestle ladders and the base sections of extension trestle ladders shall be cut on a bevel to prevent spreading.

**B 10.8** 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 shall be an integral part of each ladder.

**B 10.9** The locking device for securing the extension section to the base shall be of standard design.

**B 10.10** The bearings shall consist of rungs not less than  $1\frac{1}{4}$  inches in diameter with  $\frac{7}{8}$  inch tenons mortised into the side rails at least  $\frac{7}{8}$  inch or if of oval bars not less than  $\frac{3}{4}$  inch by 2 inches mortised into the side rails and spaced not more than 18 inches apart on centers.



## PART C: EXCAVATION WORK

### Section 1. General

C 1.1 Banks of trenches in unstable or soft material four (4) feet or more in depth, or in hard or compact soil five (5) feet or more in depth and eight (8) feet or more in length shall be shored, sheeted, braced, sloped to the angle of repose, or otherwise supported by means of sufficient strength to protect the men working within them.

The use of portable trench boxes, cages, or shields designed, constructed and maintained in a manner which will provide protection equal to or greater than the sheeting and shoring required for the situation may be used in lieu of sheeting and shoring requirements.

Banks over six (6) feet resulting from excavation for bulkhead construction, retaining walls, bridge abutments, wing walls, etc. where danger of slides or cave-ins exist and workmen may be endangered, shall be shored to protect workers, unless sloped to the angle of repose.

The design of the supporting systems required shall be based on calculations of pressures in which consideration is given to the type and condition of the material to be retained, surcharges to be imposed by nearby structures, machinery and stored material, vibrations from blasting, equipment, traffic and any other pertinent condition.

Exception: This rule does not apply to trenches in solid rock, hard shale, hard pan, cemented sand and gravel or other similar material.

The requirements of this section shall not apply if in the written opinion of a Registered Professional Civil Engineer the protection devices are not needed to prevent the walls of the excavation from failure or collapse. Such opinion shall be available to the inspector and an attested copy filed in the Department of Labor and Industry.

**C 1.2** As used in this code, sheeting shall mean material used on the sides of excavations to retain the earth, and requires bracing at the top and bottom. Sheet piling shall mean similar material used for the retention of earth but which is driven into the earth and requires bracing only at the top or intermediate levels.

**C 1.3** Surface areas adjacent to the sides of excavations should be well drained where possible and practical. Trees, boulders, or any other materials that may slide into the excavation shall be removed or otherwise secured against sliding. Excavations shall be inspected after every rainstorm or other hazard increasing occurrence and the protection against slides or cave-ins increased if necessary.

**C 1.4** Prior to the opening of an excavation, available plans, plats, or other documents of record shall be examined to determine if underground installations such as water and sewer lines, electric, gas, or other utilities will be encountered. When the excavation approaches the estimated level of such installation, it shall be located by safe and suitable methods and when uncovered, shall be properly protected and supported. Extra care shall be taken when the installation is known to contain gas or some other inflammable or explosive substance.

**C 1.5** Foundations adjacent to where excavations are to be made below the depth of the foundation, shall be shored and braced as long as the excavation remains open.

**C 1.6** Before bracing or sheeting is removed, the trench or excavation shall be partially backfilled. Backfilling and removal of bracing, shoring and sheeting shall progress together from the bottom of the excavation or trench. All personnel shall be cleared from the trench or excavation before bracing is completely removed.



C 1.7 Where hand excavating is carried to such a level as to require the use of intermediate shoveling platforms, said platforms shall be substantially constructed and installed and equipped to prevent material from falling back into the excavation.

C 1.8 Pick and shovel men shall be kept far enough apart to prevent their injuring one another.

C 1.9 No tools or materials or debris shall be left within two feet of the edge of an excavation where they might be knocked off or cause a worker to lose his footing.

C 1.9.1: Excavated material, heavy equipment, and traffic shall be kept back from edge of trench a distance equal to one half its depth.

Exception: Where it is impossible to comply with Rule C 1.9.1, the shoring system shall be designed to support the added weight imposed as required by Rule C1.1.

C 1.10 Ladders or ramps shall be provided for entrance and egress to and from all excavations over 4 feet in depth. Ladders extending from the floor of trench excavations to not less than 3 feet above the top ground surface, shall be placed in trench excavations 4 feet or more in depth and within 50 feet of any employees working in the trench.

## **Section 2. Warning and protective measures**

C 2.1 Torches, lanterns, flashers, or electric lamps shall be placed along the exposed sides of all excavations at night, as required to warn the public. Sidewalks, walkways, roadways, or other provisions for pedestrian and vehicular traffic shall be adequately illuminated and proper warning devices or signs placed in position to give sufficient warning of the excavation. Warning signs shall be posted at all truck entrances and exits.

C 2.2 Guardrails or barricades shall be provided at or near the sides of all excavations as necessary to protect the public and workmen. The use of trucks



or heavy equipment for barricades is prohibited. Where traffic is to be maintained over or adjacent to excavations, there shall be provided walkways, bridges, ramps etc., of sufficient strength and rigidity to support the loads to be imposed upon them with adequate safeguards.

C 2.3 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.

C 2.4 Sidewalks and walkways shall be kept clear of excavated material or other obstruction. No sidewalk shall be undermined unless suitably shored.

### **Section 3. Sheeting, Sheet Piling, Shoring and Bracing**

C 3.1 Materials used for timber sheeting, sheet piling, shoring, bracing and underpinning shall be in good serviceable condition, sound and free from splits, shakes and large knots. Recommended minimum nominal dimensions and spacings are shown in Table 1 and in no case shall be less than 2 inches nominal size in the smallest dimension. Steel sheet piling may be substituted for tongue and groove sheeting and shall be braced and shored as needed in accordance with the design of such sheet piling.

C 3.2 When placing vertical sheeting not less than two stringers and sets of horizontal bracings shall be provided, one placed near the top and one near the bottom of the sheeting as needed to meet the pressures imposed. Where conditions prohibit the use of horizontal bracing, substantial shoring or tie-backs shall be provided. Such shoring shall be secured against a substantial bearing and proper steps taken to prevent kicking-out or other displacement. Tie-backs shall be anchored well back of the angle of repose.

C 3.3 Excavations and the installation of bracing, shoring and sheeting shall progress together from the ground level. Where additional lengths of sheeting are used, the stringers supporting the bottom of the upper length shall not be removed.

C 3.4 Timber shores and braces shall be designed as columns, the following formula shall be used as a guide:

$$P=A (1300 - 20 L/D)$$

Where P=total permissible load in pounds: A= cross sectional area of the timber in square inches; L=unbraced length of the timber in inches; D= least dimension of the cross section of the timber.

C 3.5 Any supporting system installed under the requirements of this code shall remain in place until the removal thereof is specifically approved by a responsible supervisory official on the job. Temporary sheeting, installed to permit the construction of a retaining wall shall not be removed until the retaining wall has acquired its design strength.







## **PART D: MAINTENANCE AND USE OF HEAVY EQUIPMENT AND TRUCKS**

### **Section 1. General**

D 1.1 All maintenance and repair work including oiling and greasing shall be done only when equipment is shut down except if necessary for the machine to be in operation for its proper repair, extreme caution must be exercised.

D 1.2 Any guard or safety device removed or made ineffective shall be replaced and the machine restored to safe operating condition before the machine is placed in operation.

D 1.3 Heavy machinery, equipment or parts thereof, shall be substantially blocked or cribbed before men are permitted to work underneath them.

D 1.4 No repairs on blade or dozer equipment, pans, scrapers, etc. shall be made unless motor has been stopped, and the blade is resting on the ground or securely blocked.

D 1.5 The dipper, bucket, blade, fork or other load-carrying or working device of all excavators, loaders, graders, bulldozers, scrapers, cranes, or other such equipment shall be on the ground or substantial support used when the equipment is not in use. If equipped with cabs, the cab shall be locked to prevent entrance by children or other unauthorized persons.

D 1.6 No person shall get off or on equipment while it is in motion.

D 1.7 Minimum requirements for wire rope, rope fasteners and sheaves shall be according to section Q.

### **Section 2. Trucks**

D 2.1 All dump trucks loaded under power equipment shall have an adequate steel cab protector which will safely protect those within the cab

against impacts. When necessary to load or unload over the cab of any vehicle, no person shall remain in it.

**D 2.2** No person shall work under the raised body of a truck unless the body is blocked up from the frame of the truck by a timber in an upright position near the front of the body or other suitable safety device.

**D 2.3** All cleaning of debris or other work around a tailgate of a truck shall be done with tools. At no time shall a man's hands be between a tailgate and the body of the truck.

**D 2.4** The dumping mechanism of all bottom dump wagons shall be controlled from the cab of the truck or rear of the wagon. The use of bottom dump wagons of the type which require a man to run along side the moving vehicle in order to trip the gate release shall not be permitted.

**D 2.5** Back up alarms shall be provided on all trucks when backing into the skip of concrete pavers, bituminous pavers or other areas where workmen are engaged, except when under the direction of a dump man who shall have no other duties which would prevent his giving full attention when vehicles are backing.

### **Section 3. Cranes, Shovels, and Backhoes**

**D 3.1** Capacity information, when available, shall be kept with all cranes so that safe load can be computed. Loads in excess of capacity shall not be allowed.

**D 3.2** For the purpose of increasing work loads, no cranes shall be equipped anywhere with counterweights in excess of the manufacturer's recommendations.

**D 3.3** No crane shall be equipped or used with boom and/or jib which exceeds the length specified by the manufacturer.



D 3.4 Guy wires shall not be attached to the boom tip to give the boom additional capacity except as recommended by the manufacturer.

D 3.5 Devices to prevent the boom from falling over backward shall be provided on all cranes and on all other equipment with booms that present similar hazards.

D 3.6 Boom sections that have been damaged in use must be replaced or repaired with workmanship and quality of materials comparable or superior to that used in the original boom.

D 3.7 Repealed November 5, 1969.

D 3.8 The crane operator and the man designated to be his signalman shall review and understand the work to be performed prior to starting, and shall use standard signals.

D 3.9 Before a capacity lift, and at least once each week, the operator shall inspect the equipment. Inspection shall include but not be limited to slings, chokers, hooks, shackles, cable, brakes, clutch, etc.

D 3.10 Any machinery or equipment found to be in an unsafe condition shall be tagged at the operator's position - - "Out of Service, Do not use", and its use prohibited until unsafe conditions have been corrected.

D 3.11 Brakes shall be tested before handling capacity loads. The operator shall test the hoist brake after the load has been lifted a few inches; if brakes fail to hold, the brakes should be adjusted or repaired.

D 3.12 No load shall be lifted higher than the work requires.

D 3.13 While a load is suspended from a crane, the operator shall not leave his position at the controls.

D 3.14 Operators shall not leave cab when the motor is running.

#### **Section 4. Operation of Power Cranes and Shovels in proximity to overhead utility lines**

D 4.1 When power shovels or cranes are being operated in proximity to overhead utility lines of any electric voltages, a person shall be designated whose exclusive responsibility shall be to watch the boom and cables of such crane or power shovel. Said person shall have the authority to direct the activities of the shovel or crane operator and any other person working in direct connection with the crane or shovel while said crane is operating in proximity to overhead utility lines of any voltages as aforesaid. The boom and cables of cranes and power shovels shall be kept away from all electric wires regardless of their voltage.

D 4.2 No persons except the operator shall remain in contact with a crane or shovel, the boom or cables of such crane or shovel, or with or near material being moved by said crane or shovel while it is being operated in proximity to overhead utility lines carrying currents of any voltages. Where it is necessary to control the movement of material, or parts of the crane or shovel while it is being operated in proximity to overhead utility lines as specified, such control shall be effected by the use of guide lines properly secured and in sufficient number. Such guide lines shall be of dry manila rope of sufficient size, or equivalent non-conductive material.

D 4.3 On construction projects of sufficient magnitude and duration, requiring continuous operation in proximity to overhead utility lines carrying currents of any voltage, affected utility companies shall be requested to install and maintain temporary facilities around the work or other acceptable protective measures.

D 4.4 The following provisions are incorporated within the code as recommended safe and proper procedures.



If the boom or cables accidentally come into contact with a wire, the operator should swing the crane so as to get clear again. If the wire has been broken or the boom cannot be cleared from it, the operator should remain on the rig and keep calm. All other persons should remain free from the rig and the power company notified of the emergency situation. All wires, broken or not, shall be considered ALIVE. Stepping from the crane to the ground may be fatal; therefore, the operator should remain on the crane until the emergency crew from the electric company arrives and frees the crane from the live wire.

If the gasoline tank should become ignited or if for any reason it is impossible for the operator to remain on the crane, he should JUMP making sure that all parts of his body are clear of the crane before he touches the ground.

If a person should receive an electric shock he should be removed from the contact by safe and proper means. He should be moved no farther than it is required for safety of those persons administering first aid to the accident victim. Artificial respiration should be administered as soon as possible by a person qualified in such procedure. Fire, police, or other safety officials shall be notified and a doctor called to the scene. The victim should not be moved from the site except under the authority of a doctor or a person qualified to render first aid in such cases.

## **PART E: HOUSEKEEPING AND DISPOSAL OF WASTE MATERIAL**

**E 1.1** All stairways, passageways, and gangways shall be kept free from materials, supplies, and obstructions. Such stairways, passageways, and gangways, if subject to water, ice, or mud shall be kept clear of such hazard and suitable means shall be used to give adequate footing.

**E 1.1.1** All working areas, passageways and stairwells, shall be provided with adequate light.

**E 1.1.2** All temporary lights should be caged or guarded to prevent shattering of bulbs.

**E 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, from open perimeter areas of structures.

**E 1.3** Loose or light material shall be safely secured when left lying about on roofs or floors that are not enclosed.

**E 1.4** Tools, materials, or debris shall not be strewn about in a manner which may cause tripping, slipping or other hazard.

**E 1.5** Wiring, cables, and hose shall be located in such a manner as to provide passageway free from tripping hazards.

**E 1.6** Bolts, nuts, rivets, nails, tie-rods, etc. shall be collected at frequent intervals, placed in suitable receptacles and not left to accumulate and be a hazard.

**E 1.7** Protruding nails shall be removed, hammered in, or bent over flush.

**E 1.8** Waste material and rubbish, when temporarily stored within the building, shall not be allowed to accumulate in quantities which will overload the floor construction.



**E 1.9** Covered receptacles shall be provided for combustible materials. Such receptacles shall be emptied and the material suitably disposed of at least once daily.

**E 1.10** Empty bags having contained lime, cement, and other dust-producing material shall be removed from work areas daily.

**E 1.11** All scrap lumber, waste material, and rubbish shall be collected and stored in piles for removal at frequent intervals and not left to accumulate and be a hazard.

**E 1.12** Waste material shall not be disposed of by burning within the building.

**E 1.13** Waste material and rubbish shall not be thrown from upper levels to lower levels or to the ground. The use of chutes is permitted.

## **PART F: MINIMUM FIRST AID REQUIREMENTS**

**F 1.1** On all construction projects, activities or installations, a 16-unit first aid kit shall be provided and maintained complete in the ratio of one for each 25 persons employed or fraction thereof. The 16-unit first aid kit shall contain at least the following materials or their equivalent:

- 2 pkgs. compress bandage, 4"
- 2 pkgs. compress bandage, 2"
- 2 pkgs. adhesive compress, 1"
- 1 pkg. triangular bandage, 40"
- 2 pkgs. ointment for burns or other approved burn treatment
- 2 pkgs. iodine brushes or merthiolate
- 1 pkg. ammonia inhalants
- 1 pkg. gauze bandage, 4"
- 1 pkg. paper cups
- 1 pkg. tourniquet and forceps
- 1 pkg. eye dressing packet

**F 1.2** A stretcher is recommended for all construction projects and shall be required on all projects on which 25 or more workers are employed.

**F 1.3** On projects employing 25 or more, a telephone and/or radio available for emergency calls shall be maintained. The telephone numbers of ambulance service, available doctors, resuscitator equipment, and fire department shall be posted by the telephone. At least one employee shall be qualified to administer first aid. It is recommended that all foremen be trained in emergency first aid treatment. On jobs where dependable response of an organized rescue unit is available, the requirement for a person trained to administer first aid is waived.

**F 1.4** Contractors shall provide for adequate transportation to carry injured workers to proper medical facilities. Such transportation shall not consist of the injured worker driving his own vehicle, but may consist of an automobile driven by another person.



F 1.5 All construction projects on which more than 100 persons are employed shall establish a first aid station adequately equipped. On roads or similar activities where the work is spread over a large area a mobile first aid station may be used. A person qualified to administer first aid shall be on duty at all hours when work is in progress. First aid stations shall be constructed of such materials as to facilitate the maintenance of sanitary conditions. The minimum acceptable equipment for a first aid station shall be:

- a. Stool or chair
- b. Treatment table
- c. Sterilizer
- d. Gooseneck lamp
- e. Treatment chair
- f. Foot pedal waste container
- g. Wash bowl supplied with running water. If from a storage tank the tank shall be not less than 25 gallon capacity.
- h. Cot
- i. Supply cabinet containing not less than:
  - Thermometer
  - Cotton balls
  - Applicators
  - Ace bandages 2½", 3½", or 4"
  - Tongue depressors
  - Spirits of ammonia
  - Oxygen
  - 1" Adhesive compress (bandaids)
  - 2" Bandage compresses
  - 3" Bandage compresses
  - 4" Bandage compresses
  - 1" Gauze roller bandages
  - 2" Gauze roller bandages
  - 3 x 3 Plain gauze pads
  - Eye dressing packets
  - Plain absorbent gauze
  - Triangular bandages
  - Tourniquet scissors - tweezers
  - Burn ointments

Exception: This section may be waived when the project is located so that hospital facilities may be reached within 15 minutes and the preceding sections shall then apply.

**F 1.1a** A suitable blanket to protect the injured worker from shock shall be included as part of the minimum first-aid kit on all construction project activities or installations.



## **PART G: POISONOUS, HOT, OR OTHER HARMFUL SUBSTANCES OR CONDITIONS**

**G 1.1** When work is to be performed in an area or building or other structure where the presence of hazardous gases, dusts, fumes and other toxic or harmful substances is suspected or known to exist (as in the alteration or additions to existing facilities), the individual in charge of the work shall determine the extent of those hazards and shall provide adequate warning.

**G 1.2** All persons required to use respirators or other protective equipment shall be properly instructed in the use of such equipment.

**G 1.3 Hot Substances:**

**a.** Heating devices or melting kettles shall be placed on a level, firm foundation and protected against traffic, accidental tipping or similar hazard.

**b.** Enclosed areas in which hot substances are being heated or applied shall be mechanically ventilated, if natural ventilation is insufficient.

**c.** A fire extinguisher approved by National Fire Protection Association for B and C fires, such as ABC or Purple K dry powder, or carbon dioxide, shall be available at all locations where heating kettles or melting kettles are in use. Burners using liquid fuel shall be shut down while refueling. Heating devices or melting kettles when in use shall not be left unattended.

**d.** Asphalt or tar heating kettles shall be provided with a lid.

**e.** Ladles, equipment, and material shall be moisture-free before being used or placed in heated material.

**f.** Proper runways or passageways, clear of obstructions shall be provided for all persons carrying hot substances. Carrying hot substances up or down ladders is prohibited.

- g.** Hoisting gear shall be adequate for loads imposed and shall be securely and substantially braced.
- h.** Proper protection shall be provided for all persons handling hot substances.
- i.** Buckets or vessels for handling hot substances shall be substantially constructed and free from any soldered joints or attachments.

**G 1.4** In areas where employees are exposed to poison ivy, oak or sumac, or other poisonous plants, the following protective measures, as pertinent shall be provided:

- a.** Employees shall be instructed in the identification of the plants and preventive measures.
- b.** Where practicable the plants shall be removed or destroyed. If destroyed by chemical means, proper instruction and protection against those chemicals shall be provided. When ivy or similar plants are burned, all persons shall be kept clear of the smoke.
- c.** Appropriate protective clothing, gloves, etc., shall be worn.
- d.** Protective ointments shall be provided.
- e.** Soap and water shall be made available for washing exposed parts of the body.
- f.** Approved first aid treatment shall be provided for treatment of affected skin areas.
- g.** Immunization treatments.

**G 1.5** The following provisions are incorporated within the code as recommended safe and proper procedures for protection against hazards involving insects, vermin, or snakes.

- a.** Instruction regarding potential hazard.
- b.** Boots, hoods, netting, gloves, masks, or other necessary personal protection.



- c. Repellents.
- d. Drainage or spraying of breeding areas.
- e. Burning or destruction of nests.
- f. Smudge pots for protecting small areas.
- g. Elimination of unsanitary conditions which propagate insects or vermin.
- h. Extermination measures against rodents.
- i. Inoculation.
- j. Approved first aid remedies for affected employees.

## PART H: CONSTRUCTION ELEVATORS

### Section 1. General.

#### H 1.1 Definitions

H 1.1.1 "Construction Elevator" shall mean a hoisting and lowering mechanism equipped with a car, cage, platform, bucket or other carrier which is guided and moves in a vertical, or near vertical, direction and used primarily for elevating or lowering materials for the construction, alteration, renovation, reconstruction or demolition of buildings or other structures, and shall include the driving machine, shaftway or hoistway, tower, car, cage, platform, bucket or other carrier, as well as the enclosures, doors, gates and other equipment, means and appurtenances required by these rules.

H 1.1.2 "Car" shall mean the load-carrying unit of a construction elevator, including the car frame, platform and enclosure.

H 1.2 When it is necessary for any person to enter the car of a construction elevator, means shall be provided to prevent the movement of the car when any door or gate which permits access to the car, shaftway or tower is not in the fully closed position, except that on an elevator operated by a competent hoisting engineer such a means may consist of an electrical signal system with a positive means at each landing of preventing a signal from reaching the engineer during access to the car.

H 1.3 No person except those authorized by the contractor shall be permitted to ride in or on a construction elevator.

H 1.4 Operation of a construction elevator by means of a control which may be locked into a running position is prohibited unless the equipment has a properly operating automatic power stoppage device which will shut the power off at either a specific level and/or at the terminus of travel.



H 1.5 The car shall be equipped with a mechanically applied car safety device which shall be attached to the car frame and shall be capable of stopping and sustaining the car together with its maximum allowable load.

Exceptions:

(a) Elevators having a total travel of not more than fifteen (15) feet and used only for handling materials.

(b) Concrete bucket elevators equipped as required in Rule H 2.12.3.

H 1.6 Overhead beams and their supports shall be constructed of good sound timber or steel of strength and stiffness to provide at least a safety factor of five (5) to support the maximum combined live and dead loads to be imposed thereon.

H 1.7 The guide rails shall be of sound lumber or steel of adequate uniform size to provide a firm track and shall be kept secure and in proper alignment at all times. Minimum nominal sizes for timber are shown in Table 2.1.

H 1.8 Car frames and platforms shall be constructed with sufficient strength to provide not less than a safety factor of five (5) for the rated load.

H 1.9 The cars of all construction elevators or material lift equipment used to carry persons, shall have overhead protective covering of planking or heavy wire mesh on every elevator or material lift to prevent objects from falling on the workmen.

H 1.10 The overhead protection on the car shall be made in sections and each section hinged so they may be raised when hoisting or lowering long material. The sections shall be kept closed at all other times.

H 1.11 When using an elevator for hoisting or lowering long material, the several pieces of the material shall be securely fastened together and prop-

erly secured so that no part of the load can fall or project beyond the sides of the car and get caught.

H 1.12 When wheelbarrows or other rolling equipment or material are transported, blocking, cleats or other means shall be provided on all platforms to hold such equipment or material in place.

H 1.13 The platform of every elevator shall be enclosed on the sides not used for loading or unloading, with material at least equivalent in strength to a wire screen enclosure formed of No. 16 U. S. gage wire. When enclosure of open work construction is used, the openings shall be such that one of the cross-sectional dimensions of the openings shall not exceed two (2") inches and toeboards shall be provided.

H 1.13.1 All construction elevator cars shall be fitted with a gate on the loading side. Said gate shall be of a height and strength which will prevent any material carried on the car from falling over or under the gate. Said gate shall be self closing by action of the car or shall be so constructed that the car cannot operate unless the gate is in a closed position.

H 1.14 The engineer or foreman shall be notified when any man climbs the tower or shaftway to work on any part of the tower, shaftway, overhead structure or car. The elevator shall be temporarily shut down for duration of such work.

H 1.15 The elevator operating signal code shall be posted adjacent to the signal device at each and every landing and at the operator's position when operated by a hoisting engineer. All wording shall be black on a white card in large clear letters.

H 1.16 Repealed March 15, 1962.

H 1.17 Temporary landing platforms, ramps, or runways shall be constructed in accordance with Part A, Staging and Scaffolding, of this code.



H 1.18 The hoisting engine, control mechanism and other portions of the elevator shall be properly secured to prevent unauthorized use or tampering therewith during the hours that work is not in progress. The car should be left at its lowest level during such hours.

## Section 2. Elevator Shaftways and Towers

H 2.1 All construction elevator towers shall be constructed of strong, sound materials, which shall be No. 1 Common Douglas Fir or equivalent except for car or bucket guides, which shall be clear, straight-grained Douglas Fir or equivalent, free from knots or other defects. The minimum nominal sizes of No. 1 Common Douglas Fir members in wooden towers shall be as shown in Table H 2.1. If wooden members of lesser structural strength are used, then the dimension given in Table H 2.1 shall be appropriately adjusted.

H 2.2 Towers with other than wooden members may be used if equivalent strength is provided.

H 2.3 Wooden members for the corner posts may be built up of two (2") inch material bolted together. Bolts of not less than one-half ( $\frac{1}{2}$ " ) inch in diameter shall be used and the spacing between the bolts shall not exceed two (2') feet.

H 2.4 Diagonal cross bracing shall be placed on each of the four (4) sides between horizontal cross ties, except at loading and unloading platforms.

H 2.5 Not more than two (2) diagonal braces may be removed or omitted from any sections between cross ties in the tower and never from two (2) consecutive sections.

H 2.6 Foundations for elevator towers shall be sufficiently large to distribute the resulting load so that it will not exceed the safe bearing capacity of the soil or other footing on which it stands.

H 2.7 All splice plates on wooden posts shall be not less than two (2") inches in thickness and four

(4') feet in length. Splices shall be so constructed as to develop the full strength of the member and shall be staggered.

H 2.8 Elevator towers shall be securely guyed to prevent sway and lateral movement.

H 2.9 All entrances into a shaftway or tower shall be protected by a guard rail not less than thirty-six (36") inches nor more than forty-two (42") inches from the platform level, preferably hinged to allow for vertical opening.

H 2.10 Where elevator shaftways or towers are erected inside of buildings, the sides of the shaftway or tower not used for entrances and which are accessible from any floor or platform level or levels, shall be enclosed to a height of not less than six (6') feet from the floor or platform level(s) with wire screening of not less than No. 16 U. S. gage wire or equivalent.

H 2.11 Where towers are erected outside of buildings, and the sides not used for entrances are not generally accessible except at the bottom level, such sides not used for entrances at the bottom level shall be enclosed to a height of not less than six (6') feet with wire screening of not less than No. 16 U. S. gage wire, or equivalent.

H 2.12 When used as a concrete bucket elevator, the following additional requirements shall apply:

H 2.12.1 If the bucket is discharged into a chute, the chute shall be 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 designed and anchored to the tower in such a manner as to support the full load, including impact of the concrete being discharged with a factor of safety of five (5).

H 2.12.2 Men shall not be allowed to work below the bucket without first resting the bucket on suitable



supports placed across the shaftway and supported on two (2) sides of the tower.

**H 2.12.3** Every bucket hoist having a total travel in excess of fifteen (15') feet shall be provided with a broken rope type safety device.

**H 2.12.4** Workmen shall be prohibited from riding in the bucket.

### **Section 3. Cables and Sheaves**

**H 3.1** Every elevator or material lift must be so constructed that they shall have a safety factor of not less than five.

**H 3.2** Every elevator or material lift shall have a name plate located in a prominent place upon which shall be the following information:

- a. Manufacturer's name
- b. Rated capacity
- c. Correct cable size
- d. Correct sheave size

Minimum requirements for wire rope, rope fasteners and sheaves shall be according to Section Q.

### **Section 4. Engines and Motors**

**H 4.1** All gearing on hoisting engines and driving machines shall be enclosed or guarded. Steam piping shall be insulated. Electrical equipment shall be effectively grounded.

**H 4.2** Hoisting engines and driving machines shall be of ample capacity and equipped with brakes capable of stopping and sustaining the maximum load in any position. Brakes of electric motor driving machines shall be released electrically and applied automatically by springs or gravity when the normal operating device is in the "stop" position.

**H 4.3** The hoisting engine, driving machines and the hoisting engineer shall be protected against the weather and falling objects by a substantial covering.

Table H 2.1: Minimum Sizes of Various Members in Wooden Towers

(Based on No. 1 Common Douglas Fir; for wooden members of lesser structural strength, increase cross-sections to attain No. 1 Common Douglas Fir equivalency. For members of other than material, the same minimum strength requirements shall apply.)

Cage or Bucket Capacity up to	Height from		Post Sizes (Inches)	Guide S 4 S* Sizes (Inches)	Horiz. Tie Sizes (Inches)	Diag. Brace Sizes (Inches)	Maximum Tie Spacing (Feet)
	Top	down					
500 lb	Top to	72	4 x 4	2½ x 3½	1 x 6	1 x 6	6
500 lb	72 to	198	4 x 6	2½ x 3½	2 x 6	1 x 8	6
1000 lb or ¼ cu yd	Top to	72	4 x 4	3½ x 3½	1 x 6	1 x 6	6
1000 lb or ¼ cu yd	72 to	126	4 x 6	3½ x 3½	2 x 6	1 x 8	6
1000 lb or ¼ cu yd	126 to	198	6 x 6	3½ x 3½	2 x 6	1 x 8	6
2000 lb or ½ cu yd	Top to	80	4 x 6	3½ x 3½	2 x 6	1 x 8	8
2000 lb or ½ cu yd	80 to	128	4 x 6	3½ x 3½	2 x 6	1 x 6	8
2000 lb or ½ cu yd	128 to	208	6 x 6	3½ x 3½	2 x 6	2 x 6	8
4000 lb or 1 cu yd	Top to	80	4 x 6	3½ x 3½	2 x 6	2 x 6	8
4000 lb or 1 cu yd	80 to	128	6 x 6	3½ x 3½	2 x 6	2 x 6	8
4000 lb or 1 cu yd	128 to	208	6 x 8	3½ x 3½	2 x 8	2 x 6	8

\* Surfaced on four sides



H 4.4 All hoisting equipment shall be inspected at least daily by the hoisting engineer or other qualified person, and brakes, gears, and operating devices kept in proper working condition.

H 4.5 Guards shall be provided where necessary to prevent persons coming into contact with hoisting cables.

H 4.6 Brake drums shall be kept free of oil or grease, or any substance which reduces their braking efficiency.

H 4.7 A pawl shall be provided on hoisting engines and driving machines equipped with spur gears or other free running gearing, to be used in addition to the brake to hold the load when it is suspended at rest.

H 4.8 Hoisting engines shall not be set up in the street when it can be avoided, but if so located, they shall be completely enclosed for the protection of the public, the operator, and the engine.

H 4.9 Exhaust pipes shall discharge over-head or be piped to other safe discharging point and not to obstruct the view of the engineer or create other hazards.

H 4.10 When hoisting machinery is set on an elevated platform, such platform together with guard rails, and toeboards shall be constructed in conformance with the rules in Part A, Staging and Scaffolding of this code.

H 4.11 Motor installations shall be made in accordance with provisions of applicable local codes and the National Electric Code, 1956 edition.

H 4.12 Switchboards shall be enclosed and unauthorized persons warned to keep away from them by conspicuously posted signs so lettered that the message may be read at a safe distance.

## PART I: POWDER ACTUATED TOOLS

### Section 1. Definitions

I 1.1 Power Load: Means any substance in any form capable of producing a propellant force.

I 1.2 Powder Actuated Tool: Means a tool or machine which by means of a power load propels or discharges a stud, pin, or fastener for the purpose of impinging it upon, affixing it to, or penetrating another object or material.

I 1.3 Piston Tool—Low Velocity Type: Means a tool that utilizes a piston to drive a stud, pin, or fastener and when used with any power load supplied by the tool's manufacturer, it will not cause a stud, pin, or fastener to have a velocity of more than 300' per second when measured 6.5' from the base of the tool. The tool must be so designed that it will not chamber boosters or cartridges other than those specifically designed and manufactured for it.

(Note: The measurement of the velocity is obtained by the use of accepted ballistic test methods.)

I 1.4 Power Assisted Hammer Drive Tool—Low Velocity Type: Means a tool which, by means of a heavy mass hammer, supplemented by a power load, moves a captive piston to drive a stud, pin, or fastener into a work surface. When used with any power load supplied by the tool's manufacturer, it will not cause a stud, pin, or fastener to have a velocity in excess of 250' per second when measured 6.5' from the base of the tool. It shall be so designed that it will not chamber boosters or cartridges other than those specifically designed and manufactured for it. (Note: The measurement of the velocity is obtained by the use of accepted ballistic test methods.)

I 1.5 Tool: Means a powder actuated tool, unless otherwise indicated and shall include all accessories pertaining thereto.



I 1.6 Protective Shield or Guard: Means a device or guard attached to the muzzle end of the tool which is designed to confine flying particles.

I 1.7 Stud, Pin or Fastener: Means a fastening device specially designed and manufactured for use in tools.

## Section 2. General

I 2.1 No person shall operate a powder actuated tool unless he has been instructed and trained in its proper use. Such instruction shall be furnished by the manufacturer or his authorized agent. The trainer shall furnish the trainee with written certification of his satisfactory completion of training. Such certification may take the form of a standard operators card as recommended by the Powder Actuated Tool Manufacturers Institute.

(Note: The words "piston type", "low velocity" or "powder assisted" may be substituted for "powder actuated" when proper.)

I 2.1.1 Such instruction and training shall include the following procedures:

The operator shall be trained to clean the tool correctly and to recognize any worn or defective parts or defective operation. He must also be able to use the tool safely under varying conditions, know the limitations of its use, and demonstrate his competence by actually firing the tool in the presence of the trainer. He must be familiar with the provisions of this code and instructions provided by the manufacturer for operation and care.

I 2.2 Only powder actuated charges, studs, pins, or fasteners designed and recommended for use in a specific tool by the manufacturer shall be used.

## Section 3. Tool Design

### 3A. HIGH VELOCITY TYPE

I 3A.1 The muzzle end of the tool shall have a protective shield or guard at least  $3\frac{1}{2}$  inches in diameter, mounted perpendicular to the barrel and designed to confine any flying fragments or particles that might otherwise create a hazard at the time of firing.

I 3A.2 Where a standard shield or guard cannot be used, or where it does not cover all apparent avenues through which flying particles might escape, a special shield or guard, fixtures or jig, designed and built by the manufacturer of the tool being used, which provides this degree of protection, shall be used as a substitute.

I 3A.3 The tool shall be so designed that it cannot be fired unless it is equipped with a standard protective shield or guard, or a special shield or guard, fixture or jig.

I 3A.4 The firing mechanism shall be so designed that the tool cannot fire during loading or preparation to fire, or if the tool is dropped while loaded.

I 3A.5 Firing of the tool shall be dependent upon at least two separate and distinct operations of the operator, with the final firing movement being separate from the operation of bringing the tool into the firing position.

I 3A.6 The tool shall be so designed as not to be operable other than against a work surface and unless the operator is holding the tool against the work surface with a force of at least five (5) pounds greater than the total weight of the tool.

I 3A.7 The tool shall be so designed that it will not operate when equipped with the standard guard indexed to the center position, if the bearing surface of the guard is tilted more than  $8^\circ$  from contact with the work surface.



I 3A.8 The tool shall be so designed that positive means of varying the power are available or can be made available to the operator as part of the tool, or as an auxiliary, in order to make it possible for the operator to select a power level adequate to perform the desired work without excessive force.

I 3A.9 The tool shall be so designed that all breeching parts will be visible to allow a check for any foreign matter that may be present.

I 3A.10 The tool shall be so designed that all parts of the tool will be of adequate strength to resist maximum stresses expected upon firing when using any commercially available power load which will chamber in the tools.

I 3A.11 Piston Type—Low Velocity Type shall be exempt from the provisions of Sections 3.1 through 3.10

### **3B. PISTON TOOLS—LOW VELOCITY TYPE**

#### **I 3B.1 Protective Shield or Guards**

The muzzle end of the tool shall be designed so that suitable protective shield, guards, jigs or fixtures designed and built by the manufacturer of the tool being used, can be mounted perpendicular to the barrel.

#### **I 3B.2 Firing Mechanism**

a. The firing mechanism shall be so designed that the tool cannot fire while loading or preparation to fire or if the tool is dropped while loaded.

Firing of the tool shall be dependent upon at least two separate and distinct operations of the operator, with the final firing movement being separate from the operation of bringing the tool into the firing position.

b. The tool shall be so designed as not to be operable other than against a work surface and unless the operator is holding the tool against the work

surface with a force of at least five (5) pounds greater than the total weight of the tool.

#### **I 3B.3 Variable Power**

The tool shall be so designed that positive means of varying the power are available or can be made available to the operator as part of the tool, or as an auxiliary, in order to make it possible for the operator to select a power level adequate to perform the desired work without excessive force.

#### **I 3B.4 Inspection**

The tool shall be so designed that all breeching parts will be reasonably visible to allow a check for any foreign matter that may be present.

#### **I 3B.5 Construction**

The tool shall be so designed that all parts of the tool will be of adequate strength to resist maximum stresses expected upon firing when using any commercially available power load which will chamber in the tool.

### **3C. POWER ASSISTED HAMMER DRIVE TOOLS**

**I 3C.1** Power assisted hammer drive tools shall have the characteristics outlined below and, at the discretion of the manufacturer, any additional safety features he may wish to incorporate.

#### **I 3C.2 Variable Power**

The tool shall be so designed that positive means of varying the power are available to the operator as part of the tool, or as an auxiliary, in order to make it possible for the operator to select a power level adequate to perform the desired work without excessive force.

#### **I 3C.3 Inspection**

The tool shall be so designed that all breeching parts will be reasonably visible to allow a check for any foreign matter that may be present.



### **I 3C.4 Construction**

The tool shall be so designed that all parts of the tool will be of adequate strength to resist maximum stresses expected upon firing when using any commercially available power load which will chamber in the tool, and which does not exceed the strongest power load furnished by the tool's manufacturer for use with the tool.

### **Section 4. Operation and Limitations of Use**

**I 4.1** The tool shall be tested each day before loading to see that safety devices are in proper working condition.

**I 4.2** Method of testing shall be in accordance with the manufacturer's recommended procedure.

**I 4.3** Any tool found not in proper working order shall be immediately removed from service and not used until proper repairs are made. The owner of the tool must have it serviced and inspected at regular intervals by competent service personnel and must not permit it to be altered or repaired except by repair men approved or recommended by the manufacturer.

**I 4.4** Fasteners shall not be driven into very hard or brittle materials including but not limited to cast iron, glazed tile, surface hardened steel, glass block, live rock, face brick or hollow tile.

**I 4.5** Driving into soft materials shall be avoided unless they are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.

**I 4.6** Fasteners shall not be driven directly into materials such as brick or concrete closer than three (3") inches from the unsupported edge or corner, or into steel surfaces closer than  $\frac{1}{2}$  inch from the un-

supported edge or corner, unless a special guard, fixture, or jig is used.

I 4.7 Fasteners shall not be driven through existing holes unless a positive guide is used to secure accurate alignment.

(Note: Does not apply to power assisted hammer drive tools.)

I 4.8 No fastening shall be attempted into a spalled area.

I 4.9 Tools shall not be used in an explosive or flammable atmosphere.

I 4.10 All tools shall be used with the correct shield or muzzle guard supplied by the manufacturer.

### Section 5. Tool Handling

I 5.1 No operator shall use a tool unless he is wearing safety goggles or safety glasses of an approved type.

I 5.2 Before using a tool, the operator shall inspect it to determine to his satisfaction that it is clean, that all moving parts operate freely and that the barrel is free from obstructions.

I 5.3 When a tool develops a defect during use, the operator shall immediately cease to use it until necessary repairs are made.

I 5.4 Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any workman, and hands should be kept clear of open barrel end.

I 5.5 No tool shall be loaded unless being prepared for immediate use, nor shall an unattended tool be left loaded.

I 5.6 A tool or power load charges shall never be left unattended in a place where they would be available to unauthorized persons.



I 5.7 In case of a misfire, the operator shall hold the tool in the operating position for at least fifteen (15) seconds and shall continue to hold the muzzle against the work surface during dis-assembly or opening of the tool and removal of the power load.

## Section 6. Power Loads

I 6.1 A standard means of identifying the force of power load charges contained in the various cartridges to be used in tools shall be used. Such means of identification shall be a uniform color system as follows:

Colors	Charges
Brown	Extra light
Green	Light
Yellow	Medium
Red	Heavy
Purple	Extra Heavy
Black	Magnum

I 6.2 Colors shall be strikingly printed on the cartridge container and color identification shall be further placed on the cartridge or wadding of each cartridge and shall provide a color indication of the powder charge contained therein.

## PART J: BLASTING

### Section 1. General.

**J 1.1** The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience in blasting operations. These operations shall be in accordance with the following requirements of this code; the rules and regulations of the Insurance Department of the State of Maine for the keeping and transportation of explosives; and any other applicable local, State, and Federal laws.

**J 1.2** All blasts shall be fired electrically with an electric blasting machine or properly designed electric power source, except as provided elsewhere in this code.

**J 1.3** Where detonating cord is used as the detonating agent, the detonation cord shall be fired with an electric blasting cap, except as provided in Rule J 1.17.

**J 1.4** Delay electric detonators or detonating cord connectors shall be used for all delayed blasts.

**J 1.5** Waterproof electric blasting caps or detonating cord shall be used for subaqueous blasting.

**J 1.6** All operations involving the handling or use of explosives shall be discontinued and personnel moved to safe area during approach or progress of either a thunderstorm or severe dust storm.

**J 1.7** Blasting machines and electric power sources used for firing shall be in good condition and of sufficient capacity to fire all charges. For blasting machines the following performance rating shall apply—Blasting machines shall fire without failure at least five times in succession, two electric blasting caps in series, through resistance as follows:

75 ohms for 10 cap machines  
144 ohms for 30 cap machines



208 ohms for 50 cap machines  
320 ohms for 100 cap machines

**J 1.8** When energy for blasting is taken from power circuits, the voltage shall not exceed 250 volts. The wiring and controlling arrangements shall conform to the following:

**J 1.8.1** The blasting switch shall be an Underwriters approved, enclosed, externally operated double-pole double throw switch, which when locked in the open position will short circuit the leading wires. The switch shall be installed at the location where the firing is to be controlled.

**J 1.8.2** A "safety" switch of the same type as the blasting switch shall be installed between the blasting switch and the firing circuit and lead lines, at a distance not to exceed 6 feet from the blasting switch.

**J 1.8.3** Both the safety switch and the blasting switch shall be locked in the open position immediately after firing the shot and before any person is permitted to return to the blasting area. Key to the switches shall remain in the possession of the blaster at all times.

**J 1.9** Rubber covered or other adequately insulated copper wires in good condition shall be used for firing lines and shall have solid cores of appropriate gage. Sufficient firing line shall be provided to permit the blaster to be located at a safe distance from the blast. Single conductor lead lines shall be used.

**J 1.10** Blasting operations shall be carefully planned with full consideration of all forces and conditions involved.

**J 1.11** Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other structures shall not be carried on until the operators and/or owners have been notified and precautionary measures deemed necessary for safe control have been taken.

**J 1.12** All holes loaded on a shift shall be fired on the same shift unless watchmen are provided to continuously guard the loaded area until it is fired.

**J 1.13** The use of black powder is prohibited except on quarrying operations performed by the contractor incidental to the project and where the characteristics of black powder are required.

**J 1.14** Only Fume Class I explosives shall be used in tunnel and underground blasting operations.

**J 1.15** Mobile type radio transmitters shall be prohibited within 220 feet of any electrical blasting caps or electrical blasting system.

**J 1.16** Electrical blasting operations or storage of electrical detonators shall be prohibited in vicinity of radio frequency (RF) transmitter stations except where the clearances given in Table below can be observed.

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 .....	2,200
10,000-25,000 .....	3,500
25,000-50,000 .....	5,000
50,000-100,000 .....	7,000

**J 1.17** When necessary to perform blasting operations at distances less than those shown in table, detonating type fuse shall be used with a nonelectric cap or primer.

**J 1.18** Before a blast is fired, the rock or other substance to be shattered shall be covered with blasting mats or other means, if necessary to protect



workmen, the public, or property from injury or damage from flying rocks.

**J 1.19** 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 25 feet of explosives.

**J 1.20** Blasting caps shall not be carried in pockets of clothes.

**J 1.21** The use of dynamite that is or has been frozen is prohibited unless the dynamite has been inspected and approved for use by the manufacturer's representative.

**J 1.22** Whereas marine loading and firing is not considered a major problem in Maine construction work, it has not been included in this code. It is recommended that the rules set forth in Corps of Engineers Manual EM 385-1-1, 13 March 1958 be observed under marine operations.

## **Section 2. Handling of Explosives.**

**J 2.1** Containers of explosives shall be opened only by means of nonsparking tools or instruments.

**J 2.2** Explosives shall only be removed from containers as they are needed for immediate use and carried to the blasting area in nonmetallic containers.

**J 2.3** Explosives and detonators shall be taken to the blasting area in separate nonmetallic containers.

**J 2.4** Primers shall not be made up in excess of immediate need for holes to be loaded.

**J 2.5** Primers shall not be made up in or near magazines or excessive quantities of explosives.

**J 2.6** After loading of a blast is completed, all excess explosives and detonators shall be removed to a safe location or returned at once to the storage

magazines, observing the same rules as when being conveyed to the blasting area.

**J 2.7** All empty explosive containers and packing material shall be disposed of in accordance with the manufacturer's instructions.

### **Section 3. Drilling.**

**J 3.1** All drill holes shall be of greater diameter than the diameter of cartridges of explosives used.

**J 3.2** Drilling shall not be done in an area already blasted until all remaining butts of old holes are examined for unexploded charges and the total area has been thoroughly examined to make sure that there are no additional unexploded charges remaining. Drills, picks, or bars shall not be inserted in such holes even if examination fails to disclose explosives.

**J 3.3** Drilling and loading shall not be carried on in the same area. Drilling shall be separated from loaded holes by at least twice the depth of the loaded hole.

**J 3.4** Where drilling adjacent to previously loaded areas or holes is essential, close attention must be paid to the location and direction of the holes being drilled to eliminate the possibility of drilling into the charged holes. This operation must be under the direct supervision of a competent drilling and blasting foreman at all times.

### **Section 4. Loading.**

**J 4.1** The loading or loaded areas shall be kept free of any equipment, operations, or persons not essential to loading.

**J 4.2** Tamping shall be done with a wooden stick having no metal parts, except non-sparking connectors for joining sections. Cartridges shall be seated by even, steady pressure only.



**J 4.3** All loaded holes or charges shall be checked and definitely located before firing.

**J 4.4** Reloading of sprung holes is prohibited until it is definitely established that the hole is cool.

**J 4.5** Cartridges shall be primed only in the number required for a single round of blasting. Detonators shall be inserted only in a hole in the end of a cartridge prepared especially for that purpose. Holes shall be made with a sharpened wooden stick.

**J 4.6** Where steel blasting mats are used care shall be taken to keep them from touching bare connections in the electric blasting circuits.

**J 4.7** Detonating cord shall be cut from supply reel before attaching to explosive or tamping in hole.

**J 4.8** 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.

## **Section 5. Wiring.**

**J 5.1** Each electric blasting cap shall be tested by a galvanometer approved by the Underwriters Laboratories, Inc., the U. S. Bureau of Mines, or the Department of Industrial Co-operation of the University of Maine, before stemming the hole so that an auxiliary primer may be loaded if necessary. After testing the leg wires of electric blasting caps, they shall be short circuited by twisting the bare ends together and shall remain so twisted until ready to be connected into the circuit preparatory to connecting to the firing line.

**J 5.2** Electric blasting caps made by more than one manufacturer shall not be used in the same circuit. Also, electric blasting caps of different style or function shall not be used in the same circuit even

though made by the same manufacturer unless such use is specifically approved by the manufacturer.

**J 5.3** All electric blasting caps shall be wired in a straight series when used with a hand operated generator type blasting machine and the firing line shall not be smaller than No. 14B and S gage copper wire. Not less than No. 8 caps shall be used.

**J 5.4** The number of electric blasting caps used in a circuit shall not exceed the tested capacity of the blasting machine or power source.

**J 5.5** The circuit including all caps shall be tested with a galvanometer before being connected to firing line.

**J 5.6** Lead wires shall not be connected to the circuit until such lead wires have been grounded or shorted to dissipate any static charge.

**J 5.7** The complete circuit, lead wires and firing line, shall be checked with a galvanometer at the terminals to be hooked on to the blasting machine or other power source.

**J 5.8** Firing lines shall not be connected to a blasting machine or other power source until immediately preceding the firing of the shot.

## **Section 6. Firing.**

**J 6.1** Prior to the firing of a shot, all persons in the danger area shall be warned of the blast and ordered to a safe distance from the area. Blast shall not be fired until it is absolutely certain that every person has retreated to a safe distance and that no one remains in a dangerous location.

**J 6.2** All blasting operations should use the following signals or their equivalent. **Warning signal** — A one minute series of long blasts 5 minutes prior to blast signal. **Blast signal** — A series of short blasts 1 minute prior to the shot. **All clear signal** — A prolonged blast following the inspection of blast



area. Signals for blasting shall be conspicuously posted. Competent flagmen shall be posted in all access points to danger area such as roads, walkways, railroads and water routes.

## Section 7. Inspection After Blasting.

J 7.1 Immediately after blast has been fired, the firing line shall be disconnected from the blasting machine or where power switches are used they shall be locked open.

J 7.2 A thorough inspection shall be made by the blaster to determine if all charges have been exploded. Other persons shall not be allowed to return to the area of the blast until an "All Clear" signal is given.

J 7.3 All wires shall be carefully traced and search made for unexploded cartridges.

J 7.4 Loose pieces of rock and other debris shall be scaled down from the sides of the face of excavation and the area made safe before proceeding with the work.

## Section 8. Misfires.

J 8.1 If broken wires, faulty connections, or short circuits are determined as the cause of a misfire, the proper repairs shall be made, the firing line reconnected, and the charge fired. This shall be done, however, only after a careful inspection has been made of burdens remaining in such holes and no hole shall be so refired when the burden has been dangerously weakened by other shots.

J 8.2 Misfired charges tamped with solid material shall be detonated by the following method where practical. The stemming shall be floated out by use of a water or air jet from hose until hole has been opened to within 2 feet of charge, then the water

siphoned off or pumped out; the new charge placed and detonated. Whenever this method is not practical, a new hole shall be drilled no nearer than 2 feet, loaded, and detonated. A careful search shall be made for unexploded material in the debris of the second charge.



## PART K: DEMOLITION WORK

Foreword: Before beginning the actual work of demolition, a careful study should be made of the structure that is to be torn down, and of its surroundings. A definite plan of procedure then should be mapped out, and thereafter followed as closely as possible.

### Section 1. General.

K 1.1 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 of its ultimate structural strength.

K 1.2 Gloves and hard hats shall be worn by all workmen; safety shoes with heavy soles are recommended.

K 1.3 Goggles shall be worn where there is danger of injury to the eyes.

K 1.4 Where inhalation hazards exist, workmen should wear adequate respirators.

K 1.5 Protruding nails in lumber shall be removed or bent over as the lumber is taken from the structure, or all nail-bearing lumber shall be placed in piles for future cleaning or burning.

K 1.6 Persons other than those actually engaged on demolition operations, or supervision thereof, should be prohibited from the work site.

K 1.7 Before any demolition work is started, 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.

**K 1.8** A substantial sidewalk shed of sufficient width to accommodate pedestrian traffic without congestion and lighted to ensure safe passage shall be constructed over the entire length of the sidewalk adjacent to the structure being demolished under the following conditions:

Where the—	Distance from the sidewalk to Structure is (horizontal)	and the—	Height of Structure is
1.	15 feet or less		More than 2 stories or 25 feet and less than 60 feet
2.	25 feet or less		More than 60 feet

**K 1.9** Where the structure is 25 feet or less in height and the horizontal distance from the inside of the sidewalk to the structure is more than 15 feet and less than 25 feet, a sidewalk shed may be constructed over the sidewalk as described in 1.8, or in place of such a shed, a substantial fence shall be constructed along the inside edge of the roadway. When the building is over 60 feet in height, the minimum distance for a fence shall be 25 feet.

**K 1.10** Every sidewalk shed shall be capable of safely sustaining a load of 150 pounds per square foot, and if material is to be stored thereon it shall be capable of sustaining a load of at least 300 pounds per square foot. Shed roofing shall be laid close together with ends overlapping at least 4 inches over solid bearing. All members shall be adequately braced and connected to resist distortion.

**K 1.11** The outside edge and ends of the shed roof shall be provided with an enclosure at least 42 inches above the shed roof. Such enclosures may be vertical or inclined outward at approximately 45 degrees and shall consist of boards laid close together secured to braced uprights, or of toeboards and galvanized wire netting formed of not less than No. 16, U. S. gage wire and 1½-inch mesh.



**K 1.12** 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.

**K 1.13** During the hours of darkness, warning lights or flares shall be provided on any obstruction in the line of pedestrian and vehicle traffic.

**K 1.14** When operations are not in progress, the contractor should provide sufficient watchmen to prevent the public from entering the danger zone and to maintain all danger signs, lights and barricades.

**K 1.15** During the demolition of the exterior walls of a structure originally more than five stories in height, catch platforms at least 4 feet in width shall be erected along the exterior faces of such walls where necessary to prevent injury to the public and men working below and shall be capable of sustaining a live load of not less than 125 pounds per square foot.

**K 1.16** Such catch platforms shall be constructed and maintained not more than three stories below the story from which the exterior walls are being removed. When the demolition has progressed to within three stories of ground level, catch platforms are not required but are recommended.

**K 1.17** The catch platforms shall be inclined so that the outer edge is at least 6 inches higher than the inner edge.

**K 1.18** Supports for catch platforms shall consist of outriggers of ample strength — not less than 2 inches by 6 inches on edge, secured against turning and spaced not more than 10 feet apart.

**K 1.19** Each outrigger shall have ample support against the building or in window openings and shall be adequately secured. Planks supported by

the outrigger shall be not less than 2 inches thick and the ends shall overlap each other for a distance of at least 1 foot over the supports. All planks shall be secured against displacement. Material other than planks may be used if of equal strength and it does not lessen the security against falling material.

**K 1.20** The outer edge of the catch platform should be provided with a substantial enclosure of not less than No. 16 U. S. gage wire  $1\frac{1}{2}$  inch mesh constructed at an angle of approximately  $45^\circ$  with the horizontal and having its outer edge not less than 48 inches from the platform measured along the slope of the enclosure. Such enclosure shall be substantially supported at intervals not to exceed 10 feet. There shall be no openings between the platform and the enclosure.

**K 1.21** Materials shall not be dumped on catch platforms nor shall such platforms be used for the storage of materials.

**K 1.22** Where swinging of a load creates a potential hazard, a tag line or guide rope should be used to control the load.

**K 1.23** Riding the load line of any lifting device is prohibited.

**K 1.24** 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.

**K 1.25** All structural steel should be lowered from the building and not allowed to drop.

**K 1.26** No beam shall be cut until precautions have been taken to prevent it from swinging.

## **Section 2. Preparatory Steps.**

**K 2.1** Structures adjacent to buildings to be demolished shall be braced if necessary to avoid collapse.



**K 2.2** If a structure to be demolished has been partially wrecked by fire, flood, explosion, or other causes, and where necessary to avoid collapse the walls shall be shored or braced before any demolition work is started.

**K 2.3** Before demolition work is started, the power on all electric service lines shall be shut off and all such lines disconnected at a point outside the building.

**K 2.4** All gas, water, steam, and other service lines shall be shut off and capped or otherwise controlled at a point outside the structure.

**K 2.5** 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.

**K 2.6** All exterior wall openings which extend down to floor level shall be barricaded to a height not less than 3 feet above the floor level.

**K 2.7** All floor openings and shafts not used for material chutes shall be floored over or enclosed with guard rails and toeboards.

**K 2.8** Razing of exterior walls and floor construction should begin at the top of the structure and proceed downward, and each story of exterior wall and floor construction should be removed before the removal of walls and floors in the story next below is started.

**K 2.9** First-aid and fire-fighting equipment shall be provided.

### **Section 3. Passageways, Stairs, and Ladders**

**K 3.1** Walkways and passageways shall be provided for the use of the workmen and all such walkways

and passageways shall be kept adequately lighted and free from debris and other materials.

**K 3.2** Handrails should be kept on staircases, and staircases shall be maintained in good condition as long as they are in use.

**K 3.3** All ladders shall be secured against slipping at the bottom and against movement in any direction at the top.

#### **Section 4. Removal of Walls.**

**K 4.1** 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.

**K 4.2** Wherever necessary for protection of workmen, the walls, partitions, or floors of the structure being demolished shall be shored or braced.

**K 4.3** Structural or load-supporting members shall not be cut or removed until all loads carried by those members have been removed.

**K 4.4** Any lath and plaster should be stripped off throughout the building to eliminate dust before the more substantial portions of the structure are removed. Water should be used to reduce dust when plaster or brickwork are being torn down. All glazed sash, doors and other glass shall be removed before demolition is started.

**K 4.5** Roof trusses and wall bracing shall not be disturbed until the wall sheathing in the story in which the bracing is installed is removed.

**K 4.6** All walls should be demolished by men working from a scaffold. No man shall be allowed to stand on top of a wall less than 12 inches wide to demolish the same.

**K 4.7** Screens or other suitable protection should be provided when workmen are employed below other



workers or when they are exposed to flying pieces from other demolition work. Before demolishing any interior or exterior wall which is within 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.

**K 4.8** Workmen shall not be permitted to work on top of a wall when weather conditions constitute a hazard.

**K 4.9** At the completion of each day's work, all walls shall be left stable and in no danger of being overturned.

**K 4.10** When a structure is being demolished by mechanical means, K 1.5, K 4.1, K 4.3, K 4.4, K 4.5, K 4.6, and K 5.2 shall not apply.

#### **Section 5. Removal of Floors.**

**K 5.1** Planks of ample strength (not less than 2 inches by 10 inches, nominal size) shall be used when breaking down filling between floor beams and girders. The planks shall be so placed as to give the workmen firm support should the filling material collapse, and if necessary for a workman to straddle a space between two planks, such space shall not exceed 16 inches.

**K 5.2** The demolition of floor arches shall not be started until they and the surrounding floor area for a distance of 20 feet have been entirely cleared of debris and other unnecessary material.

**K 5.3** When floor arches have been removed, the beams on which any derrick is supported and the area immediately surrounding it shall be completely planked over except for such openings as are required for handling material or equipment.

#### **Section 6. Removal of Materials.**

**K 6.1** No material shall be dropped to any point lying outside the exterior walls of the building except through enclosed wooden or metal chutes.

**K 6.2** All material chutes which are at an angle of more than 45° from the horizontal shall be entirely enclosed on the top and sides except for openings for the receiving of materials. Chutes at less than 45° may be left open on the top.

**K 6.3** Baffles should be installed in chutes where excessive speeds are encountered, and in no case shall a chute have a straight run for more than two floor levels.

**K 6.4** A strong gate shall be installed in each chute at or near the discharge end, and a danger sign should be placed in a conspicuous position to warn the public.

**K 6.5** When operations are not in progress, the danger area at the discharge end of each chute shall be completely enclosed or otherwise made inaccessible.

**K 6.6** Any objects weighing 150 pounds or over shall not be dropped by means of chutes.

**K 6.7** Lengthy objects such as planks, lumber, poles, etc., shall not be lowered by means of chutes; material such as doors, windows, lumber, and steel shall be lowered by proper tackle.

**K 6.8** Material or debris should not be removed from chutes with hands. Proper tools shall be used for this purpose.

**K 6.9** If debris is dropped through holes in the floor without the use of chutes, the intermediate openings shall be completely enclosed with barricades or substantial guard rails not less than 36 inches high and at a distance of not less than 6 feet from the edge of the opening. No such barricade or guard rail shall be removed until the story immediately above has been demolished to the floor line and all debris removed.

**K 6.10** When a floor beam is cut to make an opening for disposition of debris or material, the free ends of the beam so cut shall be securely supported



and braced. The total area of the openings so made shall not exceed 25% of the total area of the floor measured from the inside faces of the exterior walls.

**K 6.11** A toeboard or bumper not less than 2 inches thick and 6 inches high (nominal size) shall be provided at each chute or other 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. Such opening shall be provided with standard guard rails except at the point of dumping.

### **Section 7. Storage Areas.**

**K 7.1** In buildings having wooden floor construction, the flooring boards may be removed from not more than one floor above the ground level to provide storage space for debris, provided falling material is not permitted to endanger the stability of the structure.

**K 7.2** In buildings of fireproof construction, floor arches to an elevation of not more than 25 feet above the ground level may be removed to provide storage for debris, provided such removal does not endanger the stability of the structure.

**K 7.3** Walls shall not be subjected to excessive lateral pressure from stored material or lateral impact from falling material.

**K 7.4** Debris should be removed from the site as soon as practicable; material for salvage should be stored in an orderly manner on a site provided for this purpose. Storage of waste material or debris on any floor of the structure being demolished shall not be permitted in amounts which will exceed the original allowable floor load.

**K 7.5** Burning of debris shall be done only in areas designated as approved by local authority.

**K 7.6** The storage area 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.

**K 7.7** The dumping of material from upper floors into the storage area shall be entirely discontinued during all periods when men are working in the storage area.



## PART L: PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

Foreword: The following is incorporated in the rules and regulations for information and as recommended safe practice by the Maine State Board of Construction Safety Rules and Regulations. Certain specific requirements for use are made in other parts of the rules and regulations.

### Section 1.

L 1.1 Loose clothing should not be worn where there is danger of it catching and causing injury.

L 1.2 Clothing that is snug about the neck, wrists, and ankles should be worn to prevent the penetration of dust and other similar materials.

L 1.3 Oilskin clothing, when used on a job, should be hung up away from stoves, radiators and flammable materials and not rolled and stored in lockers or chests.

L 1.4 Supervisors should be responsible that their crews wear proper clothing and that such clothing is kept in good repair.

L 1.5 If protective equipment and clothing is issued by the contractor, such equipment and clothing should be cleaned and disinfected before re-issue.

### Section 2. Hats.

L 2.1 Construction workers should wear hard hats on all jobs.

L 2.1.1 Hard hats shall be worn by all employees where the head is exposed to injury from flying or falling objects or from other causes.

L 2.2 Hard hats of non-conductive material should be worn where there is danger of electrical contact.

### Section 3. Gloves.

L 3.1 Except when operating or working around machinery and equipment where the wearing of

gloves would create a hazard, construction workers should wear some type of gloves to protect their hands.

L 3.2 Canvas or fabric gloves may be worn for light handling work; leather gloves for protection against abrasion, sparks, or molten metal; asbestos gloves for protection against excessive heat; and rubber gloves for protection against electrical hazard.

L 3.3 Gloves of metal mesh, steel reinforced or other conductive material should not be worn where there is danger of electrical contact.

L 3.4 Long gauntlets should be worn only when specifically required to provide protection to the wrist and arm.

#### Section 4. Shoes and Leggings.

L 4.1 Safety shoes in good repair should be worn by construction workers.

L 4.2 Steel reinforced toes or toes of other conductive material should not be worn where there is danger of electrical contact.

L 4.3 Where necessary as a protection against sparks, molten metal or similar hazard, canvas or leather leggings should be worn.

L 4.4 Other types of shin and leg guards, when necessary to protect the worker, should be worn.

#### Section 5. Goggles, Helmets and Respirators.

L 5.1 Goggles, helmets, respirators, face shields and similar protection against injury to the head, eyes and by inhalation and ingestion should be worn where such hazards exist.

L 5.2 Where possible, such equipment should be individually fitted and properly maintained.



## Section 6. Other Equipment.

**L 6.1** Where hazards exist which may be avoided or mitigated by the use of appropriate protective equipment, such equipment should be worn.

**L 6.2** For special equipment to meet such hazards, standard suppliers and manufacturers of safety equipment and supplies should be consulted.

## **PART M: PROTECTION OF THE PUBLIC**

### **Section 1. General.**

**M 1.1** It shall be the duty of all contractors engaged in construction activities where the public may come in contact with such work to take precautions and provide such safeguards as are necessary to protect the public from the hazards of such operations.

**M 1.2** Such precautions shall include but are not limited to the requirements of this, Part M, Maine Construction Safety Rules and Regulations.

**M 1.3** The requirements of this section may be superseded in part or in full by such specific requirements as are contained in other Parts of these Rules and Regulations, or of local or other authority, provided that those requirements equal or exceed the protection afforded herein.

### **Section 2. Exclusion of and Warning to the Public.**

**M 2.1** Where possible and practicable the public and all unauthorized persons not employed on or having business on the job site shall be excluded from all construction or demolition work areas.

**M 2.1.1** Such exclusion may be accomplished by completely fencing or barricading the work area.

**M 2.1.2** If the provision of Section 2.1.1 is not possible or practicable, the contractor shall at least provide plainly visible signs at appropriate intervals which shall warn the public that construction activity is in process and that dangerous or hazardous conditions exist. Such warning shall include provisions that the public shall not trespass on the job site.

**M 2.1.3** There shall be at least one such sign on each open side around the perimeter of the job site.

**M 2.1.4** Warning signs shall be adequately lighted at night so that the message may be read at a safe



distance. In addition to the light for the reading of the signs, suitable warning lights, flares, lanterns or other similar devices shall be provided at each access point to the job site and at least at each sign location.

**M 2.1.5** Such lights and similar devices shall be maintained in place and lighted during the hours from sunset to sunrise.

**M 2.1.6** When barricades and warnings are not sufficient to keep the public from trespassing and incurring danger, the contractor should provide a watchman at all hours when the work is not in progress.

**M 2.2** Where construction activity is adjacent to or in close proximity to any thoroughfare, highway or sidewalk used by the public or where such activity or portion thereof must cross or impinge directly upon such thoroughfare, highway or sidewalk and where such work is not covered by the Maine State Highway Commission Standard Specifications, the contractor shall, in addition to the provisions of Section 2.1.:—

**M 2.2.1** Place warning signs, adequately lighted for observation at night on the approaches of such thoroughfares, highways, sidewalks, at a distance of not less than 25 feet nor more than 50 from the edges of the job site or the impingement for foot traffic, and not less than 50 nor more than 200 feet for vehicular traffic. If on an open highway with speed limits in excess of 35 miles per hour additional signs shall be erected cautioning construction work ahead. Such additional signs shall be placed at a distance of not less than 200 nor more than 500 feet from the site and may also be placed at intervals thereof. When the impingement requires lower speeds, the State Highway Commission may be requested to set such limits as are appropriate to the hazards.

**M 2.2.2** Such warning signs shall at least contain the words

Danger

Construction Ahead

Proceed with Caution

and may also contain any additional precautions peculiar to the specific hazard involved (e.g., Trucks Crossing; Turn Off Radios—Blasting; etc.).

**M 2.2.3** Such warning signs shall be substantially placed and erected in a manner that will prevent their being dislodged or knocked down and shall remain in place for the duration of the activity.

**M 2.2.4** If it is necessary to interrupt the flow of traffic for any purpose, the contractor shall provide a uniformed officer, a flagman or traffic controller subject to the requirements of the State Highway Commission, State Police or local authority. Such a person shall have no other duty and shall be on duty during all the hours in which the work is in progress and the hazard exists.

**M 2.2.5** Flagmen's hand signals instructions:

All flagmen shall use suitable signs or flags for the control of traffic.

Size of flag shall be a 24 x 24 inch flag, on staff 36 inches long.

To slow traffic—To slow traffic without stopping, the flag or light shall be extended into traffic lane. Then lowered before full stop is made.

To stop traffic—In daytime—The flag shall be extended into the path of an on-coming vehicle and held up still until the vehicle stops. The arm and flagstaff shall be held horizontal. The free arm should be raised with palm of hand toward approaching traffic. At Night—red flash-light or lantern shall be waved back and forth across traffic lane.

The signal to proceed—shall be given with the free hand or orally. The flag shall not be waved or otherwise used as a signal to proceed.



**Relief man**—A flagman shall not leave his post until properly relieved.

**General**—A flagman shall stand from 150 to 250 feet from the end of the working area where he can be seen by on-coming traffic for at least 500 feet. If hills, curves, bushes or trees obscure the view, the flagman shall stand where he can see and be seen by on-coming traffic, and where he can see the men working.

### **M 2.3 Standards for warning signs.**

**M 2.3.1 Traffic-control signs** shall conform to standard highway signs for shape and color.

**M 2.3.2 Danger signs** shall be used only where an immediate hazard exists. The predominating color shall be red.

**M 2.3.3 Caution signs** shall be used only to warn against potential hazards or to caution against unsafe practices. The predominating color shall be yellow.

**M 2.3.4 Instructional safety signs** shall be used where there is need for general instruction and suggestions relative to safety measures. The predominating color shall be green.

**M 2.3.5 Other signs** such as directional or informational signs (excepting those regarding fire exits and fire protection equipment locations) shall be black and white.

**M 2.3.6** Where other authority has established mandatory standards for warning signs and procedures and if such standards exceed the requirements of this section, they shall supersede the provisions of this section.

**M 2.3.7** All signs shall be at least 24" x 24" in size and the letters thereon shall not be less than 4 inches in height; numerals shall not be less than 6 inches in height.

**M 2.4** Where construction work is adjacent to or in close proximity to thoroughfares, highways, sidewalks, or passageways of any kind and there is a hazard of falling objects suitable barricades, overhead protection, protected walkways, underpasses, or other means shall be provided for the distance along the exposed side of the job site where the hazard exists.

**M 3.1** When traffic proceeds adjacent to or along an excavation, or over a fill with a steep side slope, the exposed side shall be adequately marked and at night shall be equipped with flares, luminous or reflective material.

## **PART N: WORK AROUND WATER**

**N 1.1** On all construction projects where drowning is a hazard, there shall be provided a boat, life preservers, or other suitable equipment for protecting the lives of the workers.



## PART O: WELDING AND CUTTING

### Section 1. General

O 1.1 Welding operators and helpers shall be provided with helmets or hand shields to be used in all arc welding operations. Goggles shall be worn on all gas welding, cutting or burning operations.

O 1.2 Filter lenses in helmets, shields and goggles shall be constructed in accordance with requirements of the American Standards Association Standard for Safety in Electric and Gas Welding and Cutting Operations. ASA, Z 49.1 - 1958.

O 1.3 When welding or cutting over or within 25 feet of combustible material, a portable fire extinguisher of appropriate size and type shall be provided. Such equipment may consist of a dry chemical or carbon dioxide fire extinguisher.

### Section 2. Electric arc welding.

O 2.1 Electric arc welding apparatus shall comply with the National Electrical Manufacturers Association Electric Arc-Welding Machine Standards Pub. No. EW 1-1962, and shall be installed in accordance with requirements of the National Electrical Code, 1962.

O 2.2 Frames of all electric arc welding machines operated from power circuits shall be effectively grounded with wire of not lighter than No. 8 American Gauge. The ground shall be mechanically strong and electrically adequate for the service required.

O 2.3 All electrode holders shall be fully insulated, especially designed for arc welding and of a capacity to handle the maximum rated current required by the electrodes with which the holder is intended to be used.

O 2.4 Electrodes shall be removed from the holder when not in use.

O 2.5 Welding Cables shall be kept free from grease and oil, and should be kept dry.

O 2.6 No welding machine may be operated when the cable has become worn, exposing bare conductors. Before the machine may be used, the worn cable must be repaired or replaced.

O 2.7 When 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.

### Section 3. Gas Welding and Cutting.

O 3.1 Installation and operation of gas systems and equipment used shall comply with the National Fire Protection Association Code No. 51 (under jurisdiction of the State of Maine Insurance Department).

O 3.2 Valve protection caps shall be in place, hand tight at all times, except when cylinders are connected for use.

O 3.3 Cylinders in excess of 40 pounds total weight being transported on the construction site shall be carried on a hand or motorized truck, by crane, or by two or more men, and shall be secured against accidental dislodgement.

O 3.4 Cylinders shall be securely fastened, and should be in an upright position, while connected and in use.



## PART P: ELECTRICAL SAFETY DURING CONSTRUCTION

(The intent of this section is to protect the safety of all persons on a project, not just the persons doing the electrical work.)

P 1.1 All electrical work which will not become a permanent part of the facility shall be installed in a manner consistent with good and safe practices in the trade, and shall be maintained in a safe condition.

P 1.2 All electrical equipment and tools used during construction shall be:

(a) Approved by the Underwriters Laboratories Inc., the U. S. Bureau of Mines, or the Department of Industrial Co-operation of the University of Maine;

(b) Used only for the purpose and in the manner intended; and

(c) Maintained in a condition free of defects which might create a hazard to the user or other persons.

P 1.3 All facilities and tools shall be provided with a suitable grounding device for attachment to a ground or a three-wire cord and polarized service, and shall, when in use, be connected to the grounded system.

### Exception:

Portable electric hand tools, which bear the monogram of Underwriters' Laboratories, Inc., as having been approved as Double Insulated, under the requirements of Standards for Safety 45, need not be grounded.

P 1.4 All workers should be warned of the fact that in damp areas and on humid days the possibility of accidental electrical shock is increased, so extra care should be taken.

**P 1.5** No wires or cables shall be installed in or on the ground unless specifically designed for that purpose, and all such installations shall be protected from being damaged. Any such installation shall be done in such a manner as to prevent, or shall be guarded to prevent, tripping and other accidents.

**P 1.6** Lines and devices carrying 220 volts and over shall be so identified to prevent danger to workmen.

**P 1.7** While equipment or lines are being worked on, starting or disconnecting switches or controls shall be locked out and tagged. The individual in charge of the particular crew shall place his tag on the switch and said tag shall be signed by him and shall be removed ONLY by him; after he has ascertained that all workers are cleared from the danger area or areas, he shall remove his tag and either unlock the switch or notify his superior that it is safe to do so.



## PART Q: WIRE ROPE AND SHEAVES

Q 1.1 All machines or hoisting devices using wire rope shall be equipped with rope and sheaves of the correct size as recommended by the manufacturer.

Q 1.2 The correct size of wire rope shall mean that size capable of handling the rated capacity with a factor of safety of five.

Q 1.3 Correct sheave size shall mean the size of sheave which when used with the correct wire rope size will not cause excessive wear, deformation, or injury to the cable.

Q 1.4 No wire rope shall be used when more than ten (10) per cent of the total visible 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) per cent of their original cross-sectional area, or when the rope shows marked signs of corrosion.

Q 1.5 Wire rope fastenings shall be as specified by the manufacturer for the size rope being used and securely made and maintained. When fastened with clips they shall be in accordance with the following table:

### INSTALLATION OF CLIPS\*

Rope Diameter, in.	Number of Crosby clips for eye attachment	Spacing between clips, in.
1/4	2	1½
5/16	2	2
3/8	2	2¼
7/16	2	2½
1/2	3	3
5/8	3	4
3/4	4	4½
7/8	4	5¼
1	4	6
1 1/8	4	7
1 1/4	5	8

\*The proper number and spacing of Crosby clips is important.

From HANDBOOK OF RIGGING by Rossnagel. Copyright 1950, McGraw-Hill Book Company. Used by permission of McGraw-Hill Book Company.

Q 1.6 All clips shall have the U side placed on the dead end of wire rope. All sharp edges shall be prevented from coming into contact with the wire rope.

Q 1.7

**BREAKING STRENGTH OF WIRE ROPE  
DIVIDED BY FIVE TO GIVE  
SAFE WORKING LOAD**

Diameter, in.	Mild Plow Steel Pounds	Plow Steel Pounds	Improved Plow Steel Pounds
1/4	972	1060	1260
5/16	1400	1520	1800
3/8	2120	2300	2700
7/16	2900	3200	3680
1/2	3680	4000	4840
9/16	4480	4920	5800
5/8	5600	6200	7600
3/4	8080	9200	10,520
7/8	10,400	11,600	14,000
1	13,600	15,200	18,000
1 1/8	17,200	18,800	22,400
1 1/4	21,200	23,200	27,600





