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Walking-Working Surfaces 070

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070. WALKING-WORKING SURFACES. (7-1-97)

01. Scope: (7-1-97)

02. Definitions: For other definitions of terms used in this section, see sub-section 010 of this standard. (7-1-97)

a. Dockboard, Bridge Plate is a device utilized to span the gap between highway vehicles, highway vehicles and loading dock or platform, highway vehicles and railroad cars, railroad cars and loading dock or platform. The dockboard or bridge plate may be fixed, adjustable, portable, powered, or unpowered. (7-1-97)

b. Floor Hole is an opening measuring less than twelve (12) inches but more than one (1) inch in its least dimension in any floor, platform, pavement, or yard, through which materials but not persons may fall, such as a belt hole, pipe opening, or slot opening. (7-1-97)
c. Floor Opening is an opening measuring twelve (12) inches or more in its least dimension in any floor, platform, pavement, or yard, through which persons may fall, such as a hatchway, stair or ladder opening, pit, or large utility opening. (7-1-97)

d. Guardrail is a vertical barrier erected along the open side of elevated walking surfaces, open side of stairs, or open side of ramps for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level. (7-1-97)

e. Handrail is a single railing provided for grasping with the hand, supported on brackets from a wall or partition, to provide support for persons using a stairway or ramp. (7-1-97)

f. Landing is an extended step or platform breaking a continuous run of stairs. (7-1-97)

g. Nose, Nosing is that portion of a stair tread projecting beyond the face of the stair riser immediately below. (7-1-97)

h. Open Riser is the air space between the threads of stairways without upright members. (7-1-97)

i. Platform is a working space for persons, elevated above the surrounding floor or ground, such as a balcony, or platform for the operation or maintenance of machinery and equipment. (7-1-97)

j. Rise is the vertical distance from the top of a stair tread to the top of the next higher stair tread. (7-1-97)

k. Riser is the upright member of a step situated at the back of a lower stair tread and near the leading edge of the next higher stair tread. (7-1-97)

l. Runway is a passageway for persons, elevated above the surrounding floor or ground level, such as a foot-walk along shafting or a walkway between buildings. (7-1-97)

m. Standard Strength and Construction is any construction of railings, covers, or other guards that meets the requirements of this section. (7-1-97)

n. Stairs, Stairway is a series of steps leading from one level to an other, or leading to platform, pits, boiler rooms, crossovers, or around machinery, tanks, and other equipment that is used more or less continuously or routinely by employees, or occasionally by specific individuals. A series of steps and landings having two (2) or more risers constitutes stairs or stairway. (7-1-97)

o. Stair Railing is a vertical barrier erected along exposed sides of a stairway to prevent falls of persons. (7-1-97)

p. Toeboard is a vertical barrier erected along exposed edges of a floor opening, wall opening, platform, runway, or ramp to prevent falls of materials. (7-1-97)
q. Tread, Tread Run is the horizontal distance from the leading edge of a stair tread to the leading edge of an adjacent stair tread. (7-1-97)

r. Tread Width is the horizontal distance from the front to the back of the tread including nosing when used. (7-1-97)

s. Wall Hole is an opening less than thirty (30) inches but more than one (1) inch high of unrestricted width in any wall or partition, such as a ventilation hole or drainage scupper. (7-1-97)

t. Wall Opening is an opening at least thirty (30) inches high and eighteen (18) inches wide in any wall or partition through which persons may fall, such as yard arm doorway or chute opening. (7-1-97)

03. General Requirements:

a. This section contains fundamental requirements essential to providing a safe work area. Nothing in this standard shall be construed to prohibit better or otherwise safer conditions than the minimum requirements specified herein. (7-1-97)

04. Aisles and Passageways: (7-1-97)

a. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways, and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Shelving and rack units shall be protected from collision. (7-1-97)

b. Permanent aisles and passageways shall be appropriately marked. (7-1-97)

c. All trestles in connection with industrial plants on which cars run, which are also used as walkways, shall be equipped with a walkway on the outer edge, so located as to give a safe minimum clearance of three (3) feet to cars. Such walkways shall be equipped with standard rails. Where a trestle crosses a driveway or passageway, the trestle over such points shall be solidly boarded over. (7-1-97)

05. Covers and Guardrails: (7-1-97)

a. Covers and/or guardrails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc. All open vats and tanks into which workers may fall shall be guarded with railings or screen guards. (7-1-97)

b. All open vats and tanks where workers are employed shall have a platform or walkway forty-two (42) inches below the top of the vat or tank or where the walkway is flush with the top of the vat or tank, a standard guardrail of forty-two (42) inches high shall be constructed. (7-1-97)
c. Every open tank over five (5) feet deep, excluding where agitators are used or where products may be damaged by ladders, shall have a ladder fixed on the inside so placed as to connect with means of access from the outside. Rungs shall have a clearance of at least seven (7) inches measured between the rung and the side of the tank. For ladder requirements see section 072 of this standard. (7-1-97)

06. Floor Loading Protection: (7-1-97)

a. In every building or structure, or part thereof, used for mercantile, business, industrial, or storage purposes, the loads approved by the building official shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building, or his duly authorized agent, in a conspicuous place in each space to which they relate. Such plates shall not be removed or defaced but, if lost, removed, or defaced, shall be replaced by the owner or his agent. (7-1-97)

b. No person shall place, cause, or permit to be placed on any floor, roof of a building, or other structure a load greater than that for which such floor or roof is approved by the building official. (7-1-97)

07. Hot Pipes: (7-1-97)

a. All steam pipes and pipes heated by any other means to a sufficient temperature to burn a person and which are within seven (7) feet of a floor or platform, or within fifteen (15) inches measured horizontally from stairways, ramps, or fixed ladders, if exposed to contact, shall be guarded with an appropriate guard. (7-1-97)

b. Protection from Hot Pipes. All exposed hot pipes within seven (7) feet of the floor or working platform, or within fifteen (15) inches measured horizontally from stairways, ramps, or fixed ladders, shall be covered with an insulating material or be guarded in such a manner as to prevent contact. (7-1-97)

08. Buildings and Floors: (7-1-97)

a. All buildings, docks, walkways, and other structures shall be so designed, constructed, and maintained as to provide a safety factor of four (4). This means that all members shall be capable of supporting four times the maximum strain to be imposed. (7-1-97)

b. The floors of all buildings, platforms, walks, driveways, storage yards, docks, etc., and all parts thereof, and all supporting members shall be of substantial construction, kept in good repair, and free from accumulations of debris. Floors which are maintained in a polished condition shall be polished with a non-slip preparation of an approved type. (7-1-97)

c. Flooring of buildings, ramps, docks, trestles, and other structures required to support motive equipment shall be approved for the specific load and safety requirements. (7-1-97)

09. Dockboards and Bridge Plates: (7-1-97)
a. Portable and powered dockboards and bridge plates shall be strong enough to carry the load imposed on them. (7-1-97)

b. Portable dockboards and bridge plates shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping. (7-1-97)

c. Powered dockboards and bridge plates shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) Industrial Lifts and Hinged Loading Ramps: published by the U.S. Department of Commerce. (7-1-97)

d. Handholds, or other effective means, shall be provided on portable dockboards and bridge plates to permit safe handling. (7-1-97)

e. Positive protection shall be provided to prevent trucks and railroad cars from being moved while dockboards or bridge plates are in position. (7-1-97)

f. Dockboards or bridge plates shall be driven over carefully and slowly and their rated capacity shall not be exceeded. (7-1-97)

10. Access and Service Space: (7-1-00)

a. Equipment requiring routine inspection or maintenance shall be provided with sufficient access to allow inspection, maintenance, and replacement without removing permanent construction or other equipment or disabling the function of required fire resistant construction. (7-1-00)

b. Rooms containing equipment requiring access shall be provided with a door and unobstructed passageway measuring not less than thirty-six (36) inches wide and eighty (80) inches high. (7-1-00)

EXCEPTION: Residential appliances installed in a compartment, alcove, basement, or similar space may be accessed by an opening or door and an unobstructed passageway not less than twenty-four (24) inches wide and large enough to permit removal of the largest appliance in the space, provided that a service space of not less than thirty (30) inches deep and the height of the appliance, but not less than thirty (30) inches is present at the front or service side of the appliance with the door open. (7-1-00)

c. Attics containing equipment requiring access shall be provided with the following: (7-1-00)

i. An access opening large enough to remove the largest piece of equipment, but not less than thirty (30) inches by twenty-two (22) inches. (7-1-00)

ii. An unobstructed passageway which is large enough to remove the largest piece of equipment but not less than thirty (30) inches high and thirty (30) inches wide, is no more than twenty (20) feet in length when measured along the center line of the passageway from the access opening of
the equipment, and has continuous solid flooring not less than twenty-four (24) inches wide throughout its length. (7-1-00)

iii. A level service space at least thirty (30) inches deep and thirty (30) inches wide located at the front or service side of the equipment. (7-1-00)

EXCEPTION: The passageway and level space may be omitted if the equipment can be serviced and removed through the access opening. (7-1-00)

d. Underfloor spaces containing equipment requiring access shall be provided with the following: (7-1-00)

i. An access opening large enough to remove the largest piece of equipment, but not less than thirty (30) inches by twenty-two (22) inches. (7-1-00)

ii. An unobstructed passageway which: is large enough to remove the largest piece of equipment but not less than thirty (30) inches high and thirty (30) inches wide; is no more than twenty (20) feet in length when measured along the center line of the passageway from the access opening to the equipment; (7-1-00)

iii. A level service space at least thirty (30) inches deep and thirty (30) inches wide located at the front or service side of the equipment. (7-1-00)

iv. Where the depth of the passageway or service space exceeds twelve (12) inches below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry extending four (4) inches above the adjoining grade and have sufficient lateral - bearing capacity to resist collapse. (7-1-00)

EXCEPTION: The passageway and level service space may be omitted if the equipment can be serviced and removed through the access opening. (7-1-00)

e. Roofs or elevated structures containing equipment requiring access shall be provided with the following: (7-1-00)

i. An approved means of permanent access, the extent of which shall be from grade or floor level to the equipment and its level service space. Such access shall not require climbing over obstructions greater than thirty (30) inches high or walking on roofs having a slope greater than four (4) to twelve (12) or a thirty-three (33%) percent slope. (7-1-00)

EXCEPTION: Equipment may be accessed by a portable ladder on the single story portion of a residential occupancy or a private garage or car port. (7-1-00)

EXCEPTION: Equipment may be accessed by portable ladder on the single story portion of an existing building that does not exceed sixteen (16) feet in height. (7-1-00)
ii. A level service platform at least thirty (30) inches deep and thirty (30) inches wide located at the front or service side of the equipment. The sides of the service platform shall be provided with standard guard railing meeting the requirements of Section 070.14 of this Standard. Ladders and cat walks providing the required access shall meet the requirements of Section 072.06 for fixed ladders and Section 070.14 for catwalk guard rails of these Standards. Additionally, catwalks shall not be less than twenty-four (24) inches wide. (7-1-00)

iii. Permanent ladders and catwalks shall be fixed to the structure and anchor points, ladder, and catwalk shall be of sufficient strength to handle the intended occupant and material load. Stairways providing the required access shall comply with Section 071 of these Standards. (7-1-00)

f. Overhead spaces containing equipment requiring access shall be arranged to permit the required access and the surface below the equipment shall permit the safe use of a portable ladder or scaffolding sufficient to accomplish the purpose for which the access was required or a permanent access shall be provided as required by Section 070.10 of this standard. (7-1-00)

11. Other Working-Walking Surfaces: (7-1-97)

a. Industrial Machine Areas shall have machines so located as to give enough clearance between machines so that the movement of one operator will not interfere with the work of another. Ample room shall be provided for cleaning machines and handling the work, including material and scrap. (7-1-97)

b. The arrangement of machines shall be such that operators will not stand in required aisle ways. (7-1-97)

c. Aisles shall be provided with sufficient width to permit the free movement of employees bringing and removing material. This aisle space is to be independent of working and storage space and shall be defined by marking. (7-1-97)

d. Wood platforms used on the floor in front of machines shall be of substantial construction with nonslip surfaces. (7-1-97)

12. Protection for Floor/Walkway Openings: (7-1-97)

a. Every stairway floor/walkway opening shall be guarded by a standard railing constructed in accordance with sub-section 070.14 of this section. A guardrailing shall be provided on all exposed sides of a stairway except at the entrance to the stairway. For infrequently used stairways where traffic across the opening prevents the use of fixed standard guardrails such as when located in aisle spaces, etc., the guard shall consist of a hinged floor opening cover of standard strength and construction and removable standard guardrails on all exposed sides except at the entrance to the stairway. (7-1-97)

b. Every ladder way floor, walkway, or platform opening shall be guarded by a standard guardrail with standard toeboard on all exposed sides except at the entrance to the opening, with
the passage through the guardrail either provided with a swinging gate or so offset that a person cannot walk directly into the opening. (7-1-97)

c. Every hatchway and chute floor/walkway opening shall be guarded by one of the following: hinged floor opening cover of standard strength and construction equipped with standard guardrails or permanently attached guardrails so as to leave only one (1) exposed side. When the opening is not in use, the cover shall be closed or the exposed side shall be guarded by removable standard guardrails. A removable guardrail with toeboard on not more than two (2) sides of the opening and fixed standard guardrails with toeboards on all other exposed sides. The removable guardrails shall be kept in place when the opening is not in use and shall preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where operating conditions necessitate the feeding of material into any hatchway or chute opening, protection shall be provided to prevent a person from falling through the opening. (7-1-97)

d. The area under floor/walkway openings shall, where practical, be fenced off. When this is not practical, the areas shall be plainly marked with yellow lines and telltale shall be installed to hang within five and one-half (5 1/2) feet of the ground or floor level. (7-1-97)

e. Where floor/walkway openings are used to drop materials from one (1) level to another, audible warning systems shall be installed and used to indicate to employees on the lower level that material is to be dropped. (7-1-97)

f. Every skylight opening and hole shall be guarded by a standard skylight screen or a fixed standard guardrail on all exposed sides. (7-1-97)

g. Every pit and floor opening, infrequently used, shall be guarded by a floor opening cover of standard strength and construction which shall be hinged or otherwise retained in place. While the cover is not in place, the pit or floor opening shall be constantly attended by someone or shall be protected on all sides by removable standard guardrails. (7-1-97)

h. Every utility floor/walkway opening shall be guarded by a standard utility cover which need not be hinged in place. While the cover is not in place, the utility opening shall be constantly attended by or shall be protected by removable standard guardrails. (7-1-97)

i. Every temporary floor/walkway opening shall have standard guardrails, or shall be constantly attended by someone. (7-1-97)

j. Every floor/walkway hole into which persons can accidentally walk shall be guarded by either: a standard guardrail with standard toeboard on all exposed sides, or a floor hole cover of standard strength and construction that shall be hinged or otherwise secured in place. While the cover is not in place, the floor hole shall be constantly attended by someone or shall be protected by a removable standard guardrail. (7-1-97)

k. Every floor/walkway hole into which persons cannot accidentally walk due to fixed machinery, equipment, or wells shall be protected by a cover that leaves no openings more than
one (1) inch wide. The cover shall be securely held in place to prevent tools or materials from falling through. (7-1-97)

1. Where doors or gates open directly on a stairway, the requirements of sub-section 040.18 of this standard shall apply. (7-1-97)

13. Protection for Wall Openings and Holes: (7-1-97)

a. Every wall opening from which there is a drop of more than thirty (30) inches shall be guarded by one (1) of the following: guardrail, roller, picket fence, half door, or equivalent barrier. The guard may be removable but should preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where there is exposure below to falling materials, a removable toeboard or the equivalent shall also be provided. When the opening is not in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately forty-two (42) inches above the floor level and of standard strength and mounting. (7-1-97)

b. An extension platform onto which materials can be hoisted for handling, shall have guardrails or equivalent guards. (7-1-97)

c. Every chute wall opening from which there is a drop of more than thirty (30) inches shall be guarded by a standard guardrail or equivalent barriers or as required by the conditions. (7-1-97)

d. Every window wall opening at a stairway landing, floor, platform, or balcony shall comply with the following: windows or openings with glazing shall meet the requirements of sub-section 040.21 of this standard; if the opening is thirty (30) inches above the next level it shall have a standard guardrail and toeboard. (7-1-97)

e. Every temporary wall opening shall have adequate guards of sufficient height but these need not be of standard construction. (7-1-97)

f. Where there is a hazard of materials falling through a wall hole, the hole shall be protected by a standard toeboard or enclosing screen when persons can pass under, there is moving machinery, or there is equipment with which falling materials could create a hazard. (7-1-97)

14. Protection of Open-Sided Floors, Platforms, and Runways: (7-1-97)

a. Every open-sided floor or platform thirty (30) inches or more above adjacent floor or ground level shall be guarded by a standard guardrail or the equivalent as specified in sub-sections 070.14 and 070.16 of this standard on all open sides, except where there is entrance to a ramp, stairway, or fixed ladder. NOTE: For areas containing water the measurement shall be computed as if there the water was not there. The guardrail shall be provided with a toeboard wherever, beneath the open sides, persons can pass, there is moving machinery, or there is equipment with which falling materials could create a hazard. EXCEPTIONS: On the loading side of loading docks and on the auditorium side of a stage or performance side of an enclosed platform. (7-1-97)
b. Every runway/walkway shall be guarded by a standard guardrail or the equivalent as specified in sub-sections 070.14 and 070.16 of this standard on all open sides thirty (30) inches or more above floor or ground level. NOTE: For areas containing water the measurement shall be computed as if there the water was not there. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side. (7-1-97)

c. Runways used exclusively for special purposes such as oiling, maintenance, or filling tanks may have the railing on one (1) side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a runway of not less than eighteen (18) inches wide. Persons, utilizing runways, exposed to machinery, electrical equipment, or other danger shall require additional guarding. (7-1-97)

d. Regardless of height, open sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, pickling, or galvanizing tanks, degreasing units, and similar hazards shall be guarded with a standard guardrail and toeboard. (7-1-97) e. Standard guard rails for non-public areas shall be provided where the roof hatch opening is located within ten (10) feet of a roof edge or open side of a walking surface and such edge or open side is located more than thirty (30) inches above the floor, roof, or grade below. (10-1-06)

f. Tools and loose materials shall not be left on overhead platforms, walkways, and scaffolds. (7-1-97)

15. Guardrail Details: (7-1-97)

a. Guardrails shall be not less than forty-two (42) inches high.

EXCEPTION: The top of guardrails on a balcony immediately in front of the first row of seats when there is no cross-aisle in front of these seats shall not be less than twenty-six (26) inches in height. See Figure 070.14-A. (7-1-97)

FIGURE 070.14-A

With no cross aisle the guardrail in front of this row of seats may be a minimum of 26 inches high. With a cross aisle the guardrail in front of row of seats is required to be 42 inches high.
EXCEPTION: The top of guardrails along a cross aisle where the seat backs are lower than twenty-four (24) inches shall not be less than twenty-six (26) inches in height. See Figure 070.14-B. (7-1-97)

FIGURE 070.14-B

Cross Aisle

The back of this seat must be at least 24 inches high. Minimum 26 inch high guardrail required when this seat back is less than 24 inches high.

EXCEPTION: The top guardrails for stairs, exclusive of their landings, may be not less than thirty-four (34) inches high.

EXCEPTION: The top of guardrails for dwellings and lodging houses, private garages, private car ports, private sheds, and interior guardrails within individual units of congregate residences and guest rooms may be not less than thirty-six (36) inches high. (7-1-97)

EXCEPTION: The top of non-industrial guardrails in buildings built prior to January 1, 1970 may be not less than thirty-six (36) inches high. (7-1-00)

EXCEPTION: The top of non-industrial guardrails in buildings built prior to January 1, 1927 may be not less than thirty (30) inches high. (7-1-00)

b. Guardrails shall be so constructed that the area in the plane of the guardrail from the top of floor, riser, or curb to the minimum required height of guardrail shall be subdivided or filled in one (1) of the following manners. Open guardrails shall have intermediate rails or ornamental pattern such that: in areas not accessible to the public a sphere twelve (12) inches in diameter and twenty-one (21) inches after July 1, 2002 cannot pass through; in areas accessible to the public, where the guardrails were constructed after January 1, 1992, a sphere four (4) inches in diameter cannot pass through; in areas accessible to the public, where the guardrails were constructed before January 1, 1992, a sphere six (6) inches in diameter cannot pass through; and the triangular opening formed by the riser, tread, and bottom element of a guardrail at the open side of a stairway shall be of a size that a sphere six (6) inches in diameter cannot pass through. (7-1-03)

c. Masonry walls may be used for any portion of the guardrail. (7-1-97)
d. Enclosure walls and guards consisting of masonry, railings, or other construction either shall be designed for loads transmitted by attached handrails or shall be designed to resist a horizontal force of fifty (50) pounds per level foot applied at the top of the guard, whichever condition produces maximum stresses. For walls or guards higher than minimum height the specified force shall be applied at a height forty-two (42) inches above the floor or tread. (7-1-97)

e. Intermediate rails, balusters and panel fillers shall be designed for a uniform load of not less than twenty-five (25) pounds per square foot over the gross area of the guardrail. (7-1-97)

16. Stairway Handrails and Guardrails: (4-7-83)

a. Every flight of stairs having four (4) or more risers or rising more than thirty (30) inches shall be equipped with standard stair railings and standard handrails as specified in this subsection, the width of the stair is to be measured clear of all obstructions except handrails. (7-1-97)

b. On stairways less than forty-four (44) inches or less wide having both sides enclosed, at least one (1) handrail, preferably on the right side descending shall be installed. (7-1-97)

c. On stairways less than forty-four (44) inches or less wide having one (1) side open, at least one stair handrail on the open side shall be installed. (7-1-97)

d. On stairways less than forty-four (44) inches or less wide having both sides open, one (1) stair railing on each side shall be installed. (7-1-97)

e. On stairways more than forty-four (44) inches wide but less than eighty-eight (88) inches wide, one handrail on each side regardless of whether the sides are open or enclosed shall be installed. (7-1-97)

f. On stairways eighty-eight (88) or more inches wide, one handrail on each side regardless of whether the sides are open or enclosed and one intermediate stair railing located approximately midway of the width shall be installed. EXCEPTION: stairs of a decorative nature in excess of that required for the occupant load of the area served by the stairs need only have intermediate handrails as needed to serve the occupant load of the stairs. See Figure 070.15-A. (7-1-97)

FIGURE 070.15-A
Assumed natural paths of travel on monumental stairs with various handrail locations.

g. Winding stairs shall be equipped with a handrail offset to prevent walking on all portions of the treads having width less than six (6) inches. (7-1-97)

17. Guardrail, Handrail, Toeboard and Cover Specifications: (7-1-97)

a. A standard guardrail shall consist of top rail, intermediate rails, ornamental grid, and posts. The standard guardrail shall have a vertical height of forty-two (42) inches nominal from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth surfaced throughout the length of the guardrail. The intermediate rails, balusters, or ornamental grid shall meet the requirements of sub-section 070.12 of this standard. The ends of the guardrails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard. (7-1-97)

b. Minimum requirements for standard guardrails of various types of construction are specified herein. For wood guardrails, the posts shall be of at least two (2) inch by four (4) inch nominal stock spaced not to exceed six (6) feet; the top and intermediate rails shall be of at least two (2) inch by four (4) inch nominal stock. If top rail is made of two (2) right-angle pieces of one (1)-inch by four (4) inch stock, posts may be spaced on eight (8) foot centers, with two (2) inch by
four (4) inch intermediate rails. For pipe guardrails, posts, and top and intermediate railings shall be at least one and one-half (1 1/2) inches nominal diameter with posts spaced not more than eight (8) feet on centers. For structural steel guardrails, posts, and top and intermediate rails shall be of two (2) inch by two (2) inch by three-eighths (3/8) inch angles or other metal shapes of equivalent bending strength with posts spaced not more than eight (8) feet on centers. The anchoring of posts and framing of members for guardrails of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least two-hundred (200) pounds applied in any direction at any point on the top rail. Other types, sizes and arrangements of guardrail construction are acceptable provided they meet the following conditions. A smooth-surfaced top rail at a height above floor, platform, runway, or ramp specified in sub-section 070.15; level forty-two (42) inches nominal; a strength to withstand at least the minimum requirement of two-hundred (200) pounds top rail pressure; protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent to at least that afforded by a standard intermediate rail; elimination of overhang of rail ends unless such overhang does not constitute a hazard; such as, baluster railings, scrollwork railings, paneled railings. (7-1-97)

c. A standard toeboard shall be a minimum of four (4) inches nominal in vertical height from its top edge to the level of the floor, platform, runway or ramp. It shall be securely fastened in place and with not more than one-forth (1/4) inch clearance above floor level. It may be made of any substantial material either solid or with openings not over one (1) inch in greatest dimension. Where material is piled to such height that a standard toeboard does not provide protection, paneling from floor to intermediate rail, or to top rail shall be provided. (7-1-97)

d. A stair handrail/guardrail shall be of construction similar to a standard guardrail but the vertical height shall be not more than thirty-eight (38) inches nor less than thirty-four (34) inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread. (7-1-97)

EXCEPTION: The top handrails in buildings built prior to January 1, 1991 may be not more than thirty-four nor less than thirty (30) inches high from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread. (7-1-00)

EXCEPTION: The top handrails in buildings built prior to January 1, 1946 may not be less than thirty (30) inches high from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread. (7-1-00)

e. A handrail shall consist of a length-wise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. (7-1-97)

f. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. Handrails shall be continuous the full length of the stairs and, except for private stairways, at least one (1) handrail shall extend in the direction of the stair run not less than twelve (12) inches beyond the top riser and not less than twelve (12) inches beyond
the bottom riser. The ends shall be returned or shall terminate in newel posts or safety terminals. See Figures 070.14-A and 070.14-B. See Figure 070.16-A & B. (7-1-97)

FIGURE 070.16-A

FIGURE 070.16-B

Minimum requirements for handrails of various types of construction are specified herein. The height of handrails shall be as specified in sub-section 070.17 to surface of the tread in line with face of riser or to surface of ramp. The size of handrails shall be: When of hardwood, shall be one and one-fourth (1 1/4) inch minimum to two (2) inches maximum in diameter; when of metal pipe, at least one and one-half (1 1/2) inches minimum to two (2) inches maximum in diameter. The length of brackets shall be such as will give a clearance between handrail and wall or any projection thereon of at least one and one-half (1 1/2) inches. The spacing of brackets shall not exceed eight (8) feet. Handrail brackets shall be such that the completed structure is capable of withstanding a load of at least two-hundred (200) pounds applied in any direction at any point on the rail. See Figure 070.16-C. (7-1-97)

FIGURE 070.16-C
**h.** Floor opening covers may be of any material that meets the following strength requirements: Trench or conduit covers and their supports, when located in roadways, shall be designed to carry a truck rear axle load of at least twenty-thousand (20,000) pounds. Utility access covers and their supports when located in roadways, shall comply with local standard highway requirements, if any; otherwise, they shall be designed to carry a truck rear axle of at least twenty-thousand (20,000) pounds. The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than one (1) inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over thirty (30) degrees. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface. (7-1-97)

**i.** Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least two-hundred (200) pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than four (4) inches long or of slat work with openings not more than two (2) inches wide with length unrestricted. (7-1-97)

**j.** Wall opening barriers shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least two-hundred (200) pounds applied in any direction at any point on the top rail or corresponding member. (7-1-97)

**k.** Wall openings grab handles shall be not less than twelve (12) inches in length and shall be so mounted as to give one and one-half (1 1/2) inches clearance from the side framing of the wall opening. The size, material and anchoring of the grab handle shall be such that the completed structure is capable of withstanding a load of at least two-hundred (200) pounds applied in any direction at any point of the handle. (7-1-97)
I. Wall opening screens shall be of such construction and mounting that they are capable of withstanding a load of at least two-hundred (200) pounds applied horizontally at any point on the near side of the screen. They shall be of solid construction, grill work with openings not more than eight (8) inches long, or slatwork with openings not more than four (4) inches wide with length unrestricted. (7-1-97)