

## 18 GUARDRAILS

A worker at risk of falling certain distances (see below) must be protected by a guardrail system or, if guardrails are not practical, by a travel-restraint system, fall-restricting system, fall-arrest system, or safety net. In many cases, guardrails are the most reliable and convenient means of fall protection and they must be your first consideration.

Guardrails or, if guardrails are impractical, other appropriate methods of fall protection must be used when

- a worker could fall more than 3 metres (10 feet) from any location
- there is a fall hazard of more than 1.2 metres, if the work area is used as a path for a wheelbarrow or similar equipment
- a worker could have access to the unprotected edge of any of the following work surfaces and is exposed to a fall of 2.4 metres (8 feet) or more:
  - a floor, including the floor of a mezzanine or balcony
  - the surface of a bridge
  - a roof while formwork is in place
  - a scaffold platform or other work platform, runway, or ramp.
- there are openings in floors, roofs, and other working surfaces not otherwise covered or protected
- there are open edges of slab formwork for floors and roofs
- a worker may fall into water, operating machinery, or hazardous substances.

Basic requirements for wood guardrails (Figure 33) include

- top rail, mid rail, and toeboard secured to vertical supports
- top rail between 0.9 m (3 feet) and 1.1 m (3 feet 7 inches) high

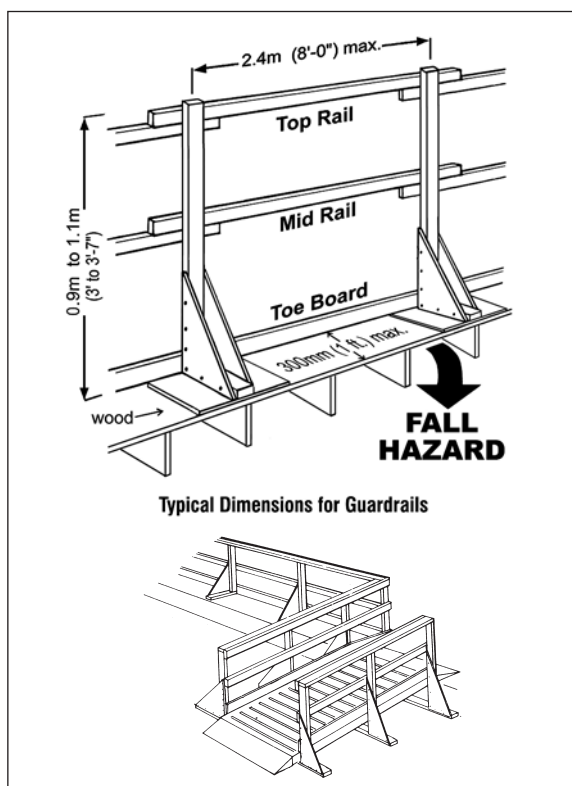
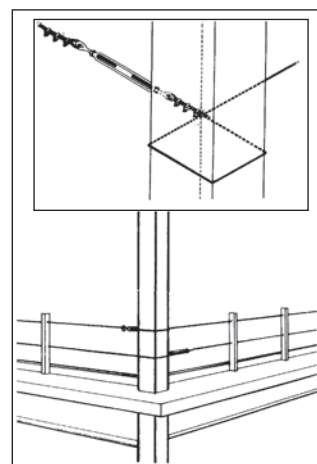
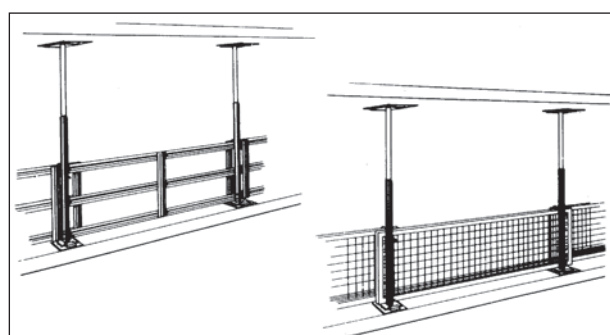


Figure 33



Wire Rope Guardrail System



Manufactured Safety Fences

Figure 34

- toeboard at least 100 mm (4 inches) high – 89 mm (3 1/2 inches) high if made of wood – and installed flush with the surface
- posts no more than 2.4 metres (8 feet) apart.

Other systems are acceptable (Figure 34) if they are as strong and durable as wood guardrails with the same minimum dimensions.

Guardrails must be installed no farther than 300 mm from an edge.

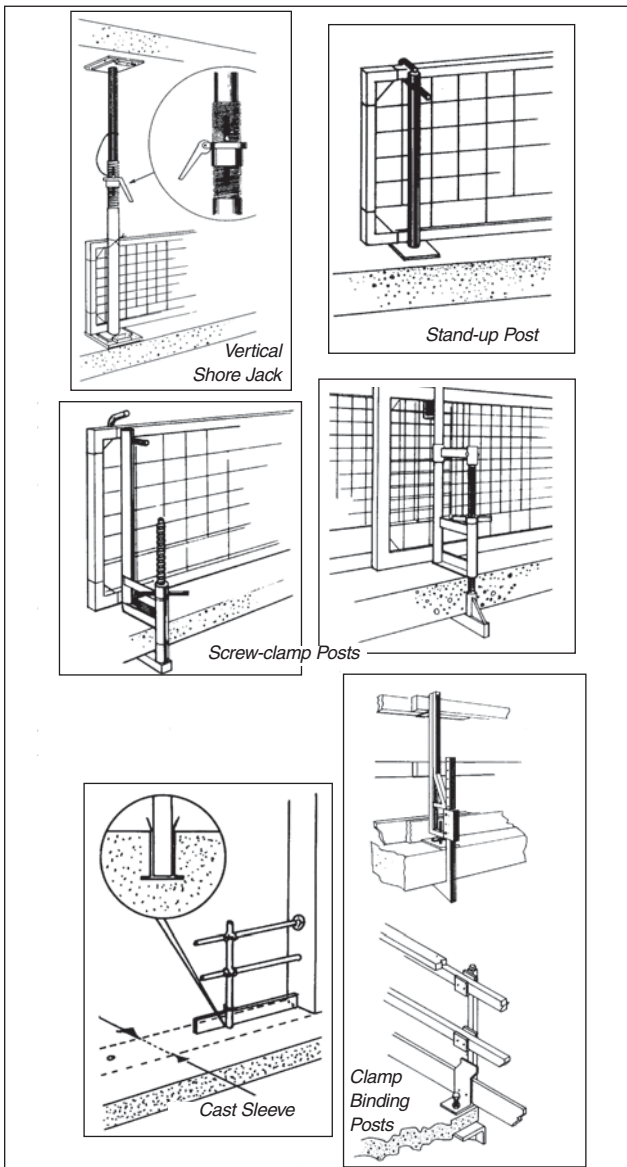
A guardrail must be capable of resisting – anywhere along its length and without exceeding the allowable unit stress for each material used – the following loads when applied separately:

- a point load of 675 newtons (150 lb) applied laterally to the top rail
- a point load of 450 newtons (100 lb) applied in a vertical downward direction to the top rail
- a point load of 450 newtons (100 lb) applied in a lateral or vertical downward direction to the mid-rail
- a point load of 225 newtons (50 lb) applied laterally to the toeboard.

### Support

Typical methods of supporting wood guardrails are shown in Figure 33. Posts extending to top rail height must be braced and solidly fastened to the floor or slab.

Shoring jacks used as posts should be fitted with plywood softener plates top and bottom. Snug up and check the posts regularly for tightness.



**Figure 35**

For slabs and the end of flying slab forms, manufactured posts can be attached to the concrete with either clamps or inset anchors (Figure 35).

**Maximum Strength**

To strengthen guardrails, reduce the spacing of posts to between 1 and 2 metres (3 feet and 4 inches and 6 feet and 8 inches) and double the 2 x 4 top rail. Posts on wooden guardrails must not be further apart than 2.4 metres (8 feet).

Where guardrails must be removed, open edges should be roped off and marked with warning signs. Workers in the area must use a fall-arrest or travel-restraint system (Figure 36).

**Floor Openings**

Guardrails are the preferred method for protecting workers near floor openings but may not always be practical. Narrow access routes, for example, may rule them out. In such cases, securely fastened covers – planks, plywood, or steel plates – may be the best alternative.

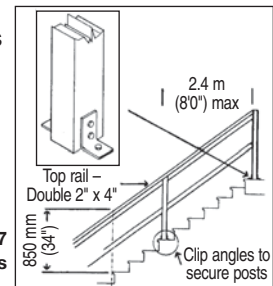
Use 48 mm x 248 mm (1 7/8" x 9 3/4") full-sized No. 1 spruce planks.

Make opening covers stand out with bright paint. Include a warning sign – DANGER! OPENING – DO NOT REMOVE! DO NOT LOAD!

Fasten the cover securely to the floor to prevent workers from removing it and falling through the opening.

**Stairs**

The open edges of stairs require guardrail protection. Specifications for a wooden arrangement are shown in Figure 37.



**Figure 37**  
**Guardrails on Stairs**

