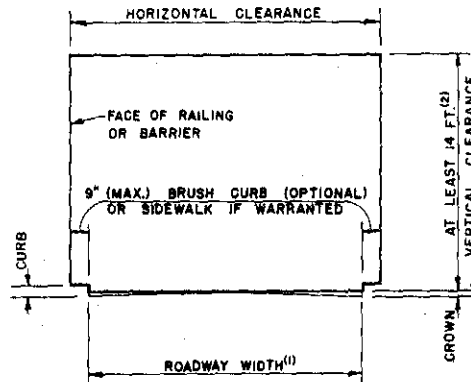


cept those streams that have been placed in the 'advance approval' category by the Commandant, U. S. Coast Guard, must be obtained from the U. S. Coast Guard and other appropriate agencies. Requests for such permits from the U. S. Coast Guard should be addressed to the appropriate strict Commander.

### (B) Vehicular

The horizontal clearance shall be the clear width and the vertical clearance the clear height for the passage of vehicular traffic as shown in Figure 1.1.7.



CLEARANCE DIAGRAM FOR BRIDGES

FIGURE 1.1.7

- 1) The roadway width shall generally equal the full shoulder width of the approach roadway. Where curbed roadway sections approach a structure, the same section shall be carried to the structure. The minimum horizontal clearance for low traffic speed, low traffic volume roads shall be 8'-0" greater than the approach travelled way. For recommendations as to roadway widths for various volumes of traffic see AASHTO "A Policy on Design Standards—Interstate System", "Geometric Design Standards for Highways Than Freeways", "A Policy on Geometric Design of Rural Highways", and/or "A Policy on Geometric Design of Urban Highways".
- 2) Vertical clearance on State trunk highways and interstate systems in rural areas shall be at least 16 feet over the entire roadway width, to which an allowance should be added for aging. On State trunk highways and interstate routes through urban areas a 16-foot clearance shall be provided except in highly developed areas. A 16-foot clearance should be provided in both rural and urban areas where such clearance is not unreasonably costly and needed for defense requirements. Vertical clearance on all other highways shall be at least 14 feet over the entire roadway width to which an allowance should be added for resurfacing.

### (C) Other

The channel openings and clearance shall be cleared with other agencies having jurisdiction over such matters. Channel openings and clearances in general shall conform in width, height, and location to all Federal, State and local requirements.

### 1.1.8 — CURBS AND SIDEWALKS

The face of the curb is defined as the vertical or sloping surface on the roadway side of the curb. Horizontal measurements of roadway and curb width are given from the bottom of the face, or, in the case of stepped back curbs, from the bottom of the lower face for roadway width. Maximum width of brush curbs, if used, shall be 9 inches.

Where curb and gutter sections are used on the roadway approach, at either or both ends of the bridge, the curb height on the bridge may match the curb height on the roadway approach, or if preferred, it may be made higher than the approach curb. Where no curbs are used on the roadway approaches, the height of the bridge curb above the roadway shall be not less than 8 inches, and preferably not more than 10 inches.

Where sidewalks are warranted for pedestrian traffic on urban expressways, they shall be separated from the bridge roadway by the use of a traffic or combination railing as shown in Figure 1.1.9.

### 1.1.9 — RAILINGS

Railing shall be provided at the edge of structures for the protection of traffic and for the protection of pedestrians if pedestrian walkways are provided.

Where pedestrian walkways are provided adjacent to roadways on other than urban expressways, a traffic railing or barrier may be provided between the two with a pedestrian railing outside.

### (A) Traffic Railing

While the primary purpose of traffic railing is to contain the average vehicle using the structure, consideration should also be given to protection of the occupants of a vehicle in collision with the railing, to protection of other vehicles near the collision, to vehicles or pedestrians on roadways being overcrossed, and to appearance and freedom of view from passing vehicles.

Materials for traffic railing shall be concrete, metal, timber or a combination. Metal materials with less than 10 percent tested elongation shall not be used.

Preference should be given to providing a smooth, continuous face of rail on the traffic side with the posts set back from the face of rail.

Structural continuity in the rail members, including anchorage of ends is essential. Open joints in the railings, together with a reduced post spacing, or bolted or welded splice material in the rails will be considered to provide this continuity. The railing system shall be able to resist the applied loads at all locations.

The height of traffic railing shall be no less than 2'-3", measured from the top of the roadway, or curb, to the top of the upper rail member. (See Figure 1.1.9). Railings other than those shown in Figure 1.1.9 are permissible provided the total applied loading is not less than 10 kips.

Careful attention shall be given to the treatment of railing at the bridge ends. Exposed rail ends, posts, and sharp changes in the geometry of the railing shall be avoided. A smooth transition by means of a continuation of the bridge barrier, guard rail anchored to the bridge end, or other effective means shall be provided to protect the traffic from direct collision with the bridge rail ends.

#### (B) Pedestrian Railing

Railing components shall be proportioned commensurate with the type and volume of anticipated pedestrian traffic, taking account of appearance, safety and freedom of view from passing vehicles.

Materials for pedestrian railing may be concrete, metal, timber or a combination.

The minimum height of pedestrian railing shall be 3'-0" (a preferred height is 3'-6") measured from the top of the walkway to the top of the upper rail member.

#### 1.1.10 — ROADWAY DRAINAGE

The transverse drainage of the roadway should be accomplished by providing a suitable crown in the roadway surface and longitudinal drainage should be accomplished by camber or gradient. Water flowing downgrade in a gutter section should be intercepted and not permitted to run onto the bridge. Short, continuous span bridges, particularly overpasses, may be built without inlets and the water from the bridge roadway carried downslope by open or closed chutes near the end of the bridge structure. Longitudinal drainage on long bridges is accomplished by means of scuppers or inlets which should be of sufficient size and number to drain the gutters adequately. Downspouts, where required, should be of rigid corrosion-resistant material not less than 4 inches in least dimension and should be provided with cleanouts. The details of deck drains should be such as to prevent the discharge of drainage water against any portion of the structure and to prevent erosion at the outlet of the downspout. Overhanging portions of concrete deck should be provided with a drip bead or notch.

#### 1.1.11 — SUPERELEVATION

The superelevation of the floor surface of a bridge on a horizontal curve shall be provided in accordance with the standard practice of the

