

Section 23 - Parapets, Railings, and Chain Link Fencing

23.1 Fencing Warrants

The following conditions warrant provision of chain link fencing on bridge structures:

1. Highway carrying, grade separation or high level bridges with facility for pedestrian traffic.
2. Expressed concern due to recorded incidents of vandalism from a structure.
3. Consistent with Item 1. above, existing or potential for pedestrian traffic nearby
 - a. Schools, churches, etc.
 - b. Built up areas
 - c. Shopping areas, malls
4. Compliance with formally published federal guidelines, if applicable.
5. Locations where existing railing or parapet conditions are substandard with regard to pedestrian safety.
6. Fencing to preclude unsafe acts or conditions; such as, snow passing through railing, pedestrian access.
7. Where any local regulations, laws or ordinances require protective screening.
8. On overpasses where property is subject to damage, such as buildings or power stations located beneath the structure.
9. Where the above conditions are not clearly present, the Designer shall judge the specific location and submit, if deemed warranted, a request to install fencing. The request shall be directed to the Manager, Bureau of Structural Engineering.

23.2 Pedestrian Bridge and Ramp Fencing And Railing Criteria

1. Handrails

Handrails shall be provided for all stairs and for ramps with grades greater than 5%. The rail height shall be 34 to 38 inches (per ADA guidelines) as measured from the tread at the face of the riser for stairs and from the ramp surface for ramps.

2. Chain Link Fence

Portions of pedestrian bridges or walkways over traffic shall be provided with chain link fabric or other approved fencing. The maximum size opening for chain link fabric shall be 1".

Where warranted due to pedestrian volume or where there are recorded incidents of objects thrown from overpasses, pedestrian bridges or walkways shall be fully enclosed with chain link fabric. The enclosure shall conform to the Type 7 detailing presented herein.

At highway crossings, chain link fencing shall extend a minimum of 30 feet beyond the outside shoulder line of the traveled way below the bridge.

3. Bicycle Railing

A bicycle railing shall be provided on bridges where the presence of bicycle traffic is known to exist. The minimum height of railing used to protect a bicyclist shall be 54 inches, measured from the top of the surface on which the bicycle

rides, to the rail. If a concrete barrier is used, smooth rub rails shall be attached to the barriers at a handlebar height of 42 inches.

Chain link fence may be used in lieu of bicycle railing. However, smooth rub rails shall be attached to the fence posts at the prescribed 42 inch height.

4. Steel/Aluminum Picket Railing

Use of steel or aluminum picket railing is permitted to accommodate pedestrian or bicycle traffic. Height of the railing shall meet pedestrian or bicycle traffic limitations stated herein. Design of the picket railing system shall be based on achieving a 75-year design service life. The *AASHTO LRFD Bridge Design Specifications* shall be used for the design.

The minimum clear opening between pickets shall be two (2) inches. The minimum clear opening under the bottom rail of the railing system shall also be two (2) inches. Warrants for installation of chain link fencing stated above shall be adhered to when a picket fence railing system is constructed.

23.3 Types of Bridge Railings

1. Illustrated herein are crash tested bridge railing systems. NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features", has established criteria; such as, speed, vehicle type and angle of impact by which bridge railing systems are categorized as meeting Test Level (TL) designations.

The illustrated systems meet Test Level 4 criteria (TL-4). For all NHS classified roadways other than Interstate highways, TL-4 type systems shall initially be considered as the minimal acceptable system for use on New Jersey bridge structures.

For those bridge structures that carry Interstate traffic, a TL-5 bridge railing system shall be utilized. Bridge Construction Detail standard drawings provide details for a 4 feet – 2 inches high heavy truck parapet (Texas Type HT railing) and 3 feet – 6 inches high "F" Shape railing respectively. These railings are classified as TL-5 systems. With the exception of the following stipulations, either of these systems may be used on an Interstate Highway.

- a. The "F" shape barrier is recommended as a better choice where heavy vehicle containment is a significant consideration. Accordingly, for those bridge structures that are located on a segment of Interstate roadway with a horizontal curve of less than 1000 feet or incorporate an Exit/Entrance ramp with a horizontal curve radius that is less than 800 feet, the "F" shape barrier shall be used.
- b. When a noise barrier is to be installed behind a bridge railing to address the concern of a large vehicle; such as, a tractor trailer or bus, overtipping and damaging the noise barrier, the Texas Type HT system shall be used.
- c. Designers must study the location of a specific bridge site when designating which of the two above TL-5 systems should be used. If the bridge parapet is essentially a continuation of the roadway barrier, then the Texas Type HT railings should be used. This will provide a uniform transition. If the bridge location is independent of a roadway barrier, then the "F"-Shape system should be used.

2. On non-NHS classified roadways, either State owned or non-State owned, the use of Test Level systems lower than the TL-4 systems are permitted. The Designer shall evaluate the roadway classification, design speed and truck traffic data for this determination. The above referenced NCHRP Report should be used for identification of the design speed and truck type which were used in establishing the Test Level ratings.

If a bridge structure, located on a non-State-owned, non-NHS roadway, meets the applicable Test Level test data for design speed and truck type usage, designation of a TL-1, TL-2 or TL-3 system is permitted.

3. With the use of the following type bridge railing configurations, in considering the height of the parapet/railing configurations, a 4 ft. 6 inch height, from the riding surface, for bicycle traffic and a 3 ft. 6 inch height from the walking surface, for pedestrian traffic, as warranted, should be provided.

Type 1. The 4 - bar tubular open steel bridge railing system, for traffic and pedestrian use, provides better driver visibility because of its see through feature. Refer to Bridge Construction Detail Drawings for detailing of this system.

Type 2. Concrete parapets, 6'-6" high and integrated with a sidewalk are used for spans over electrified railroad tracks.

Type 3A. The 2'-8" concrete parapet surmounted by a 6'-3" high chain link fence is used on local roads or land service roads which require pedestrian sidewalks. This system is used only where Type 3B cannot be used.

Type 3B. Same as Type 3A, except it has a curved top.

This system cannot be used on narrow sidewalks unless a 2'-6" minimum horizontal clearance between curb and tip end of curved chain link fence post is provided.

Type 4. A 2'-8" high parapet surmounted with an ornamental railing. Ornamental one-rail railing or two-rail railing is considered on an individual bridge basis depending on overall aesthetic considerations. This system is used on low level, short span bridges over a shallow stream or drainage area.

Type 5. Concrete parapets, 2'-10" minimum height, with NJ barrier curb configuration are generally used on bridges which do not have sidewalks. Ornamental one-rail railing may be considered on an individual bridge basis.

Type 6. Concrete parapets, 6'-8" high, integrated with NJ barrier configuration are used on spans over electrified railroad tracks where sidewalks are not required.

See Guide Sheet Plate 3.7-1

Type 7. A curved-top, totally enclosed chain link fence system, is used on pedestrian bridges. Enclosed fence shall be used for the full span length including shoulders.

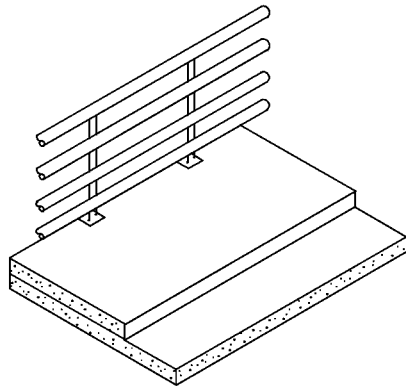
In accordance with the provisions of Subsection 13.7.3.1.1 of the *AASHTO LRFD Bridge Design Specifications*, railing systems that have been previously crash tested may be used without further analysis. Therefore, the systems identified in this Section, as detailed in Bridge Construction Detail standard drawings, may be used in a project without further design.

FHWA has developed a website that provides conceptual drawings of crash tested bridge railing systems. Designers may utilize this resource when involved in a project where railing systems, other than those identified in this Manual, are desirable. The website is: www.fhwa.dot.gov/bridge/bridgerail

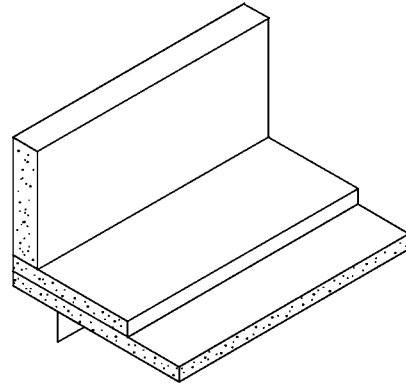
4. In order to enhance the physical appearance of bridge railings, architectural treatments to crash tested bridge railing configurations are permitted. However, the configuration (shape and size) and reinforcement detailing of crash tested systems cannot be changed. Accordingly, architectural treatments to bridge railings shall be submitted to the Bureau of Structural Engineering for review before their adoption into a project.

Any provision of recess patterns to a crash tested configuration shall be limited to a one (1) inch maximum depth. The recess patterns shall also be detailed to require a 45 degree chamfered or beveled edge.

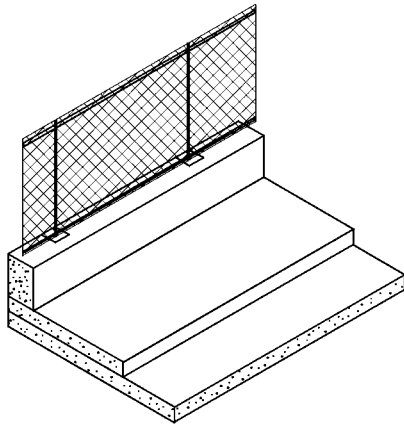
It is understood that any aesthetic treatment to a bridge railing will increase its cost. Therefore, inclusion of aesthetic treatments should be evaluated against anticipated benefits and overall project goals.



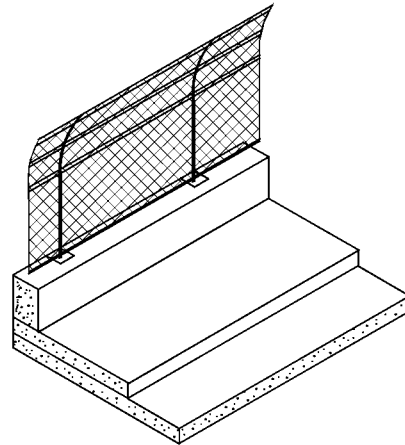
Type 1



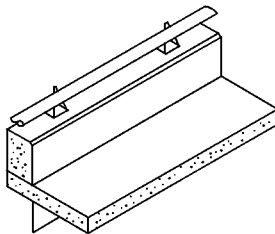
Type 2



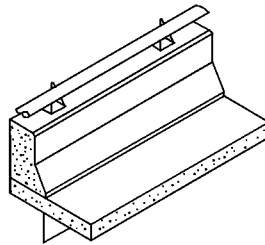
Type 3A



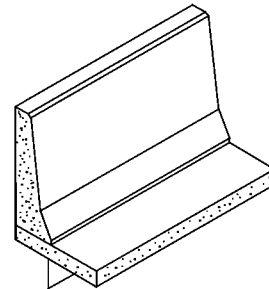
Type 3B



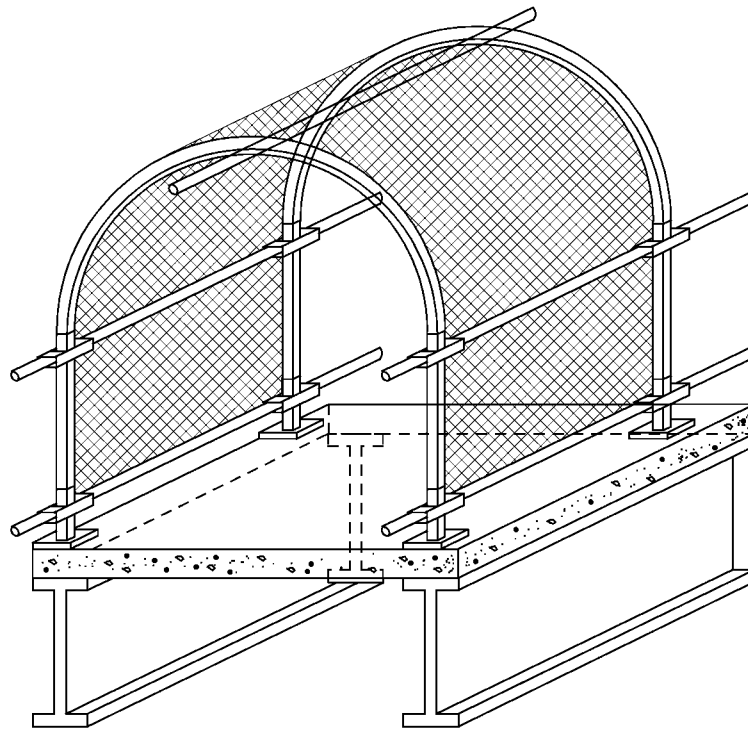
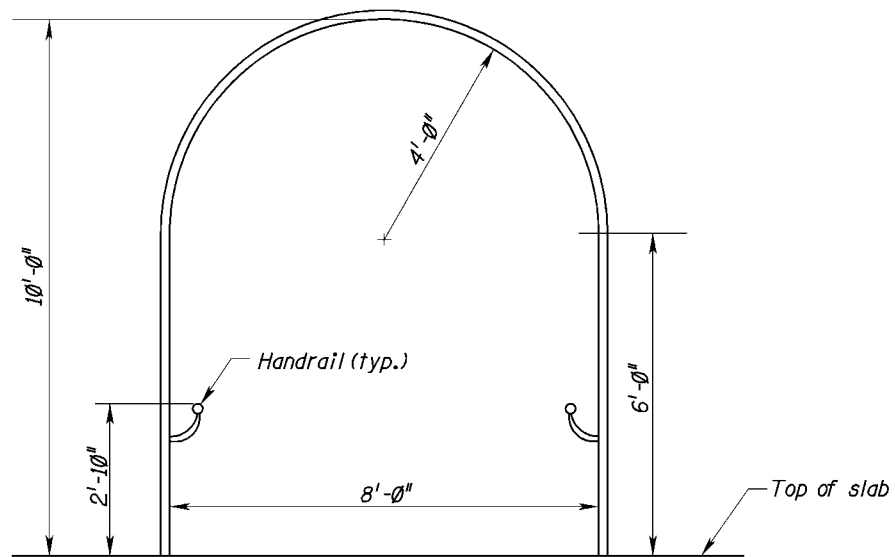
Type 4



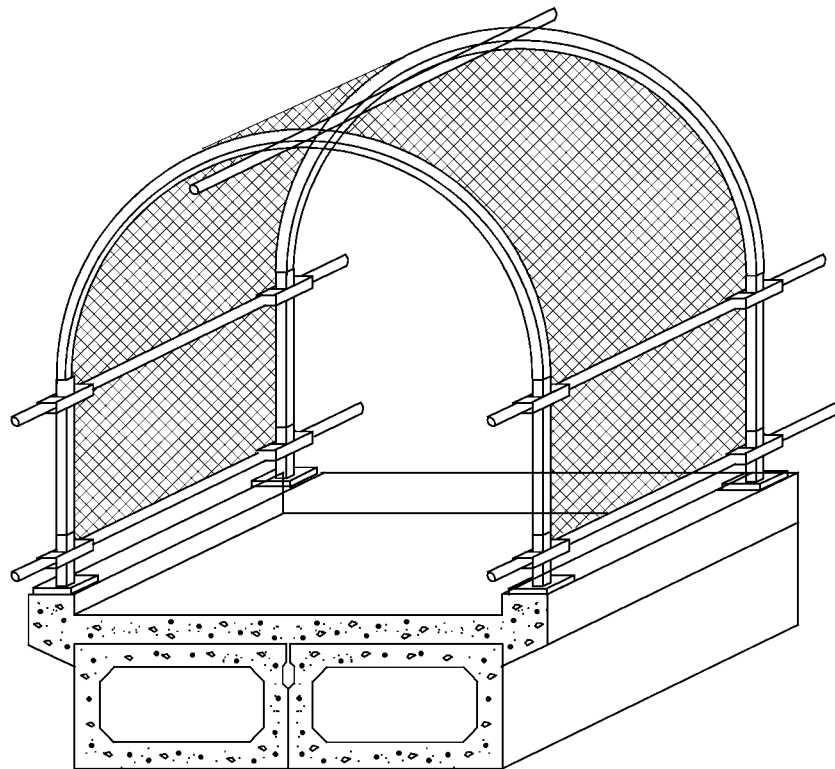
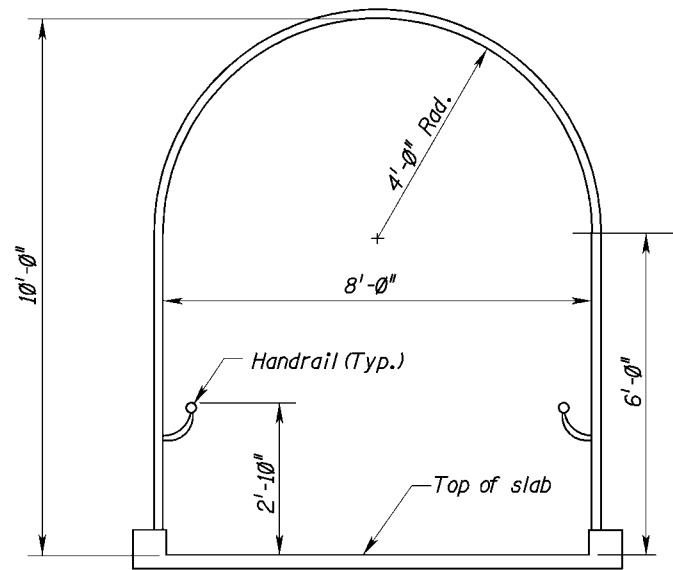
Type 5



Type 6



Type 7



Type 7 (Concrete Superstructure)