Chapter 6

Railroad Crossing

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6.1 General

This chapter provides requirements for highway-railroad crossings on the State Highway System. Coordinate projects involving a railroad crossing with the Department's Rail Office in accordance with ***Section 341.302, Florida Statutes***.

State-owned rail corridors include the Central Florida Rail Corridor and South Florida Rail Corridor.

Other railroad companies currently operating in the state of Florida include:

1. CSX Transportation, Incorporated
2. Norfolk Southern Corporation
3. Florida East Coast Railway Company

Additional shortline railroad companies and terminal switching companies also operate in the state of Florida.

6.2 At-Grade Crossings

Selection of the warning devices to be used is a function of the geometrics of railroad-highway grade crossing, including the alignment, profile, sight distance and cross section of both the roadway and the railroad. The roadway should cross the railroad at an angle of or near 90 degrees.

Design considerations are discussed in Chapter 7 of the ***Florida Greenbook*** and the ***AASHTO Policy on Geometric Design***.

6.2.1 Devices

Traffic control devices for railroad-highway grade crossings consist primarily of signs, pavement markings, flashing light signals and automatic gates. Consider the following

when designing these devices:

- Roadway type,
- Volume of vehicular traffic,
- Volume of railroad traffic,
- Speed of vehicular traffic,
- Volume of pedestrian and bicycle traffic,
- Crash data, and
- Geometrics of the crossing.

Standards and criteria for design, placement, installment and operation of traffic control devices are located in the ***Manual on Uniform Traffic Control Devices (MUTCD),*** the Department's ***Design Standards***, ***Index 17882***, and ***Rule 14-57.013, Florida Administrative Code (F.A.C.)***.

When preemptive signals are used in advance of a railroad crossing, they must be placed so as not to obstruct the view of the crossing signals.

6.2.2 Surfaces

The roadway travel lanes at a railroad crossing should be constructed for a suitable length with all-weather surfacing. A roadway section equal to the current or proposed cross section of the approach roadway should be carried through the railroad crossing. The railroad crossing surface itself should have a riding quality equivalent to that of the approach roadway. When selecting the type of crossing and the material to be used in its construction, consideration should be given to the character and volume of traffic using the roadway. The District Rail Coordinator should be consulted in selecting the material.

The ***Design Standards, Index 560*** contains details for the construction of crossings.

6.2.3 Quiet Zones

An at-grade railroad crossing within a designated Quiet Zone must comply with the ***Code of Federal Regulations (C.F.R.), Part 222*** and the ***Design Standards, Index 17882***. Quiet Zone means a segment of a rail line that includes public highway-railroad crossings at which locomotive horns are not routinely sounded. Coordinate with the Department's

Rail Office to determine if a highway-railroad crossing is located within a designated Quiet Zone.

A crossing within a Quiet Zone that involves either the State Highway System or state-owned rail lines, allowable CFR Supplemental Safety Measures (as identified in ***C.F.R., Part 222, Appendix A***) include:

- Gates with medians, or channelization using Type IV concrete traffic separators or Type F curb and gutter. Use of temporary channelization devices is not permitted.
- Four quadrant gate systems
- One-way streets with gates
- Permanent crossing closures (for off-system roads only; refer to Florida Greenbook)

The railroad crossing should be evaluated to determine if driveways, minor side streets, or turn lanes in close proximity to the crossing require an additional gate.

6.2.4 Railroad Crossing Near or Within Project Limits

Review of federal-aid projects is required to determine if a railroad-highway at-grade crossing is in or near the limits of the project. If such crossing exists, the project will be upgraded to meet the latest ***MUTCD*** requirements in accordance ***Title 23 United States Code (U.S.C.), Chapter 1, Section 109(e)*** and ***C.F.R. 646.214(b)***. These requirements are located in ***Chapter 8*** of the ***MUTCD***. "Near the terminus" is defined as being either of the following:

1. If the project begins or ends between the crossing and the MUTCD-mandated advanced placement distance for the advanced (railroad) warning sign. See ***MUTCD, Table 2C-4*** (Condition B, column "0" mph) for this distance.
2. An intersection traffic signal within the project is connected to the crossing's flashing light signal and gate.

6.2.5 Bicycle and Pedestrian Facilities

Extend proposed or existing sidewalks, bike lanes or shared use paths through the rail crossing. For additional information refer to ***Chapter 8*** of this Volume.

6.3 Grade Separations

For underpasses, the bridge carries the railway and must be designed and constructed to carry railway loadings in conformance with the ***American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering***, latest edition. For overpasses, the bridge carries highway traffic and must be designed and constructed to carry highway loadings. In either case, adequate clearances between the facilities must be provided.

Clearances, geometrics, utilities, provisions for future tracks, and maintenance road requirements for off-track equipment will involve negotiations with the governing railroad company. The railroad's review and approval, including need for and location of crash walls, are based on the completed BDR/30% Structures Plans.

Prepare the Structures Plans in accordance with the criteria obtained from the governing railroad company, the ***Plans Preparation Manual***, and the ***Structures Detailing Manual***.

See ***Figure 6.1*** for dimensions, which must be obtained from the railroad company before preparing the BDR/30% Structures Plans. The District Rail Coordinator is an additional reference source available to the designer.

6.3.1 Bridge Width

For Roadway over Railroad, the highway bridge width is determined from the approved typical section; see **Chapter 2** of this Volume. For Railroad over Roadway, the rail bridge width will be based on project specific requirements.

6.3.2 Lateral Offset to Face of Structures

Measure lateral offset in accordance with ***Figure 6.1*** and ***Table 6.3.3***. The governing railroad company may accept a waiver from standard offset requirements for designs involving widening or replacement of existing overpasses. Consult the FDOT's Rail Office when such action is being considered.

Lateral offset is measured from the centerline of outside track to the face of pier cap, bent cap, or any other adjacent structure. Minimum lateral offsets are shown in ***Table 6.3.3***; however adjustments may be required for certain physical features and obstructions.

Figure 6.1 Track Section

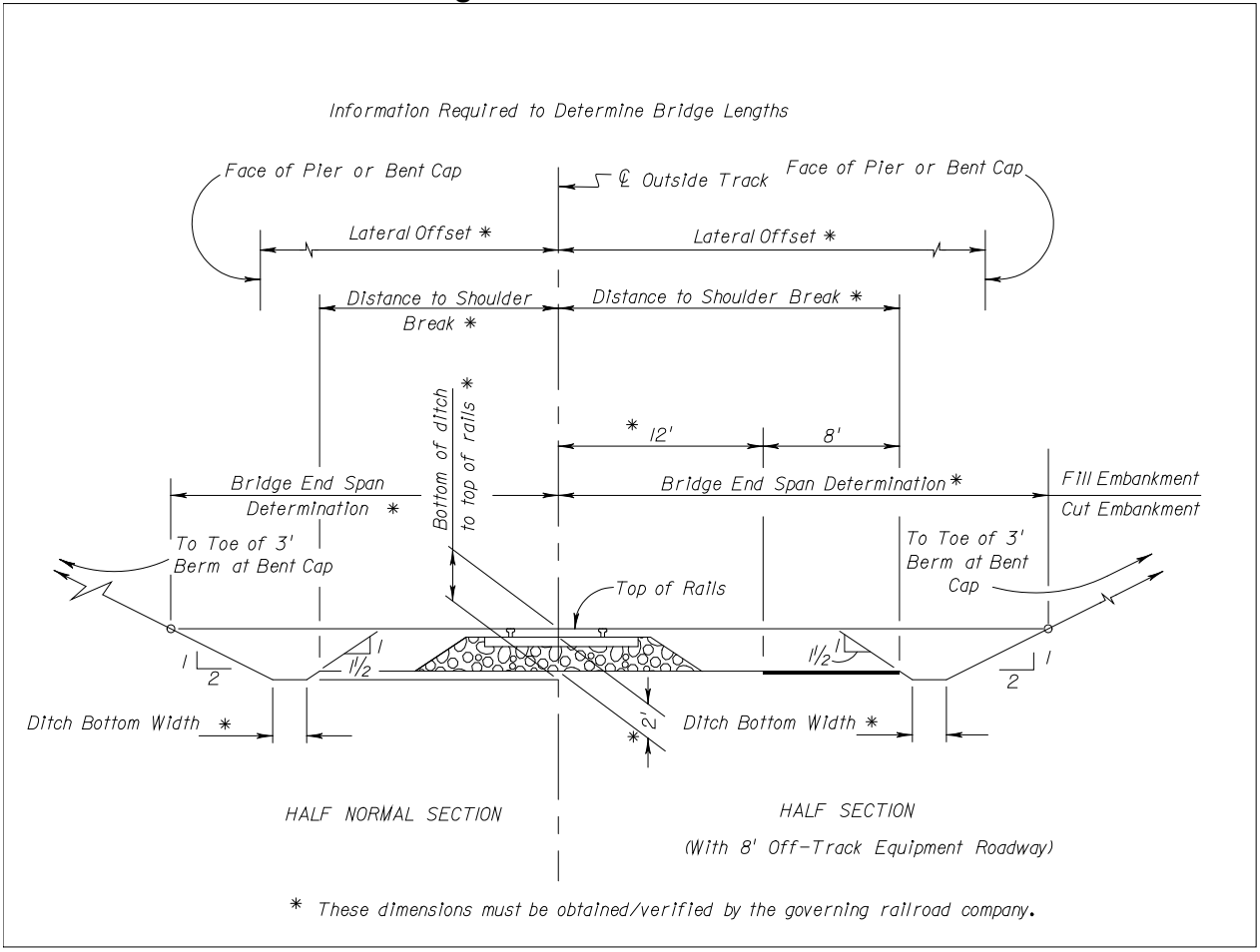

Table 6.3.3 Lateral Offsets for Railroads

Minimum Clearance Requirements	Normal Section	With 8 ft. Required Clearance for Off-Track Equip.	Temporary Falsework Opening
With Crash Walls*	18 ft.	22 ft.	10 ft.
Without Crash Walls	25 ft.	25 ft.	N/A

* See the ***Structures Design Guidelines, Section 2.6.7*** for crash wall requirements.

The additional 8 ft. clearance for off-track equipment must be provided only when specifically requested in writing by the railroad.

6.3.2.1 Adjustments for Track Geometry

When the track is on a curve, increase the minimum lateral offset by a rate of 1.5 inches for each degree of curvature. When the track is superelevated, increase the minimum lateral offset on the inside of the curve by 3.5 inches horizontally per inch of superelevation. Meet lateral offset requirements found in the ***AREMA*** ***Manual for Railway Engineering*** for extremely short radius curves.

6.3.2.2 Adjustments for Physical Obstructions

Columns or piles should be kept out of the ditch to prevent obstruction of drainage. Provide adequate lateral offset to avoid the need for crash walls unless extenuating circumstances dictate otherwise.

Figure 6.1 shows horizontal dimensions from the centerline of track to the points of intersection of a horizontal plane at the rail elevation with the embankment slope. This criteria may be used to establish the preliminary bridge length which normally is also the length of bridge eligible for FHWA participation; however, surrounding topography, hydraulic conditions, and economic or structural considerations may warrant a decrease or an increase of these dimensions. Coordinate these dimensions with the governing railroad company.

6.3.2.3 Required Foundation Clearances

Place edges of footings no closer than 11 feet from centerline of the track to provide adequate room for sheeting.

6.3.3 Crash Walls

See the ***Structures Design Guidelines*** for crash wall requirements.

6.3.4 Vertical Clearance

See ***Table 2.10.1*** of this Volume for minimum vertical clearances. Vertical clearance is the least distance between the bottom of the superstructure and the top of the highest rail utilized anywhere within the lateral offset determined by ***Section 6.3.3*** and ***Table 6.3.3***. If a track is identified as an electrified railroad, the minimum vertical clearance is 24 feet

3 inches. This provision is based on the FDOT's ***South Florida Rail Corridor Clearance Policy for 25 KV service (Topic No. 000-725-003***). This provision also applies to tracks identified as candidates for future electrification.

6.3.5 Special Considerations

1. Shoring and Cribbing requirements during construction should be accounted for in the preparation of the preliminary plans to assure compliance with the clearance criteria set forth herein. See ***Figure 6.2***.

   Anything encroaching within 10 feet of the centerline of the track (e.g., cofferdams, footings, excavation) requires approval by the governing railroad company.

2. Overpasses for electrified railroads may require protection screens.

3. Sometimes the substructure supports may be located between tracks or an outside track and the off-track equipment road.

4. Drainage from the section of the bridge above railroad right of way must be drained away from the railroad right of way. Open scuppers are to be no closer than 25 feet to the centerline of the nearest track.

6.3.6 Widening of Existing Overpasses

The requirements for widening existing overpasses are as follows:

1. If existing horizontal or vertical clearances are less than those required for a new structure, it is required that the new portion of the structure be designed so as not to encroach into the existing clearances.

2. Minimum vertical clearance should take into account the track grade and the cross slope of the bridge superstructure. Therefore, it is generally more desirable to widen on the ascending side of the bridge cross slope.

3. Minimum lateral offset should take into account future changes to track geometry, physical obstructions or foundation clearances.

4. Temporary construction vertical clearances less than 22 feet and lateral offsets less than 10 feet must be approved by the governing railroad company. On high volume rail lines, it may not be possible to reduce already restricted vertical clearances.

5. If widening requires construction of new widened approach fills, it is required that the same consideration be given to drainage design as required on new bridges.

Evaluate the need for crash wall protection if new substructures provide less than 25 feet lateral offset from center line of track.

The BDR/30% Structures Plans must show a cross section at right angles to the centerline of the track where the centerline of bridge intersects the centerline of track. In situations where the substructure is not parallel to the track, or the track is curved, sections perpendicular to the centerline of the tracks must be furnished at each substructure end.

If the railroad is in an existing cut section, plan approvals will be considered by the governing railroad company on an individual location basis. Factors to be considered will be the length, depth, and type material of the existing cut section.

Figure 6.2 Section Thru Tracks