HIGHWAY FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

Highway Attachment – At-Grade Railroad/Highway Crossings (Section 8-3.0) of the Mississippi Department of Transportation Roadway Design Manual

Biloxi, Mississippi

HWY17MH010

(7 pages)

ROADWAY DESIGN MANUAL

Mississippi Department Of Transportation

2001

Chapter 8

Special Design Elements

MISSISSIPPI DESIGN MANUAL

8-2.08.03 Types

Details for the construction of curb-cut ramps are illustrated in the *Roadway Design Standard Drawings*. The designer must ensure that the curb-cut ramp type is appropriate for the site and location. The following provides information for each type of curb-cut ramp used by the Department:

1. Type I. Flared type with grass border area. This design may be used at mid-block locations or at corners of intersections. The traffic stop line should be placed at least 48 in. in advance of the curb-cut ramp.

2. Type II. Diagonal type. This design is normally used at intersections with small turning radii. The usage of the diagonal curb-cut ramp should be avoided wherever practical due to its effect on the crosswalk width. The bottom of diagonal curb ramps should have a 48-in. minimum clear space within the marked crossing as shown. The curb-cut ramps should also have a 24-in. segment of straight curb located on each side of the ramp within the markings. This design may also be used at mid-block locations where the sidewalk is adjacent to the curb line and on the straight side of a T-intersection. If a 48-in. wide bypass area at the back of the ramp is not available, see Type IV.

3. Type III. Flared type at corners. This design is normally used at intersections with large turning radii. The curb-cut ramps at marked crossings should be contained within the markings, excluding the flared sides.

4. Type IV. Tangent type. This design may be used where there is not at least a 48-in. wide bypass area available at the back of the ramp to an obstruction.

5. Islands. Any raised islands in a crossing should be cut through level with the street or have curb-cut ramps at both sides with a level area at least 48 in. long in the portion of the island intersected by the crossing for safe refuge.

All curb-cut ramps should be constructed of portland cement concrete. Additional notes can be found in the *Standard Drawings*.

8-3.0 AT-GRADE RAILROAD/HIGHWAY CROSSINGS

8-3.01 Responsibilities

Projects with at-grade railroad/highway crossings will require special consideration by the designer. The railroad company is responsible for all work necessary for the adjustment of its tracks to meet altered or established highway grades, and the railroad will construct the roadway grade crossing as indicated on approved MDOT plans. The railroad company will also install flashing light signals, automatic gates, guardrails and other protective devices as required by the Department. All work performed by the railroad company will be conducted under an agreement between the railroad company and the Department. The agreement will be on a force account basis or with a contract that will allow the Department to reimburse the railroad company for all construction costs.

Plans for field inspection should be submitted to the Office of Intermodal Planning, Rails Manager as soon as they are available. Two sets of plans should be provided. It is desirable that a railroad representative participate in the field inspection. The Rails Manager will be responsible for negotiations with the railroad company and will prepare the required railroad agreements. Following the field inspection, the Roadway Design Division will prepare the final plans and submit plan copies to the Rails Manager for further processing with the railroad company.

If a project requires a railroad right-of-way easement or use permit, the Right-of-Way Division will prepare the necessary documents and coordinate this effort with the railroad company.

8-3.02 Design

8-3.02.01 Sight Distance

There are two sight distance applications that must be addressed at railroad/highway grade crossings:

1. Case A. Allowing an approaching vehicle to either cross or stop.
2. Case B. Allowing a stopped vehicle to cross the railroad tracks.

Figure 8-3A and Figure 8-3B illustrate the conditions under which Case A and Case B sight distances apply. Table 8-3A presents the sight distances that are required for both Case A and Case B. If actual field conditions differ from those presented in Figure 8-3A and Figure 8-3B (e.g., skewed crossings, more than one set of tracks), the designer should reference the AASHTO *A Policy on Geometric Design of Highways and Streets* to make adjustments to the criteria in Table 8-3A.

The sight distances for Case B should be available at all railroad/highway crossings. Case A is important at crossings with only passive control devices (i.e., crossbucks, pavement markings, advance warning signs). Where practical, the criteria for Case A should also be met at crossings with active control devices (i.e., flashing lights, automatic gates). The designer should note, however, that the Case A sight distances may be difficult to attain in the field. Where these distances are not practical, the following presents potential countermeasures:

1. installing active warning devices where only passive devices currently exist;

2. employing speed control signs, flashing advance warning lights and other devices to lower approaching vehicular speeds to be consistent with the available sight distance; and/or

3. forcing all vehicles to a complete stop.

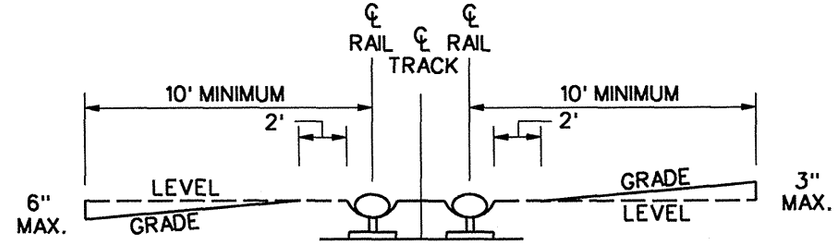
8-3.02.02 Horizontal Alignment

Where practical, the alignment of the highway and railroad crossing should intersect at an angle of 90°, and neither the highway nor the railroad should be on a horizontal curve. If these objectives are met, this will enhance driver safety and comfort; it will reduce maintenance problems; and it will improve roadway rideability. The designer should refer to Chapter 3 for the Department's criteria on horizontal alignment for highways.

8-3.02.03 Vertical Alignment

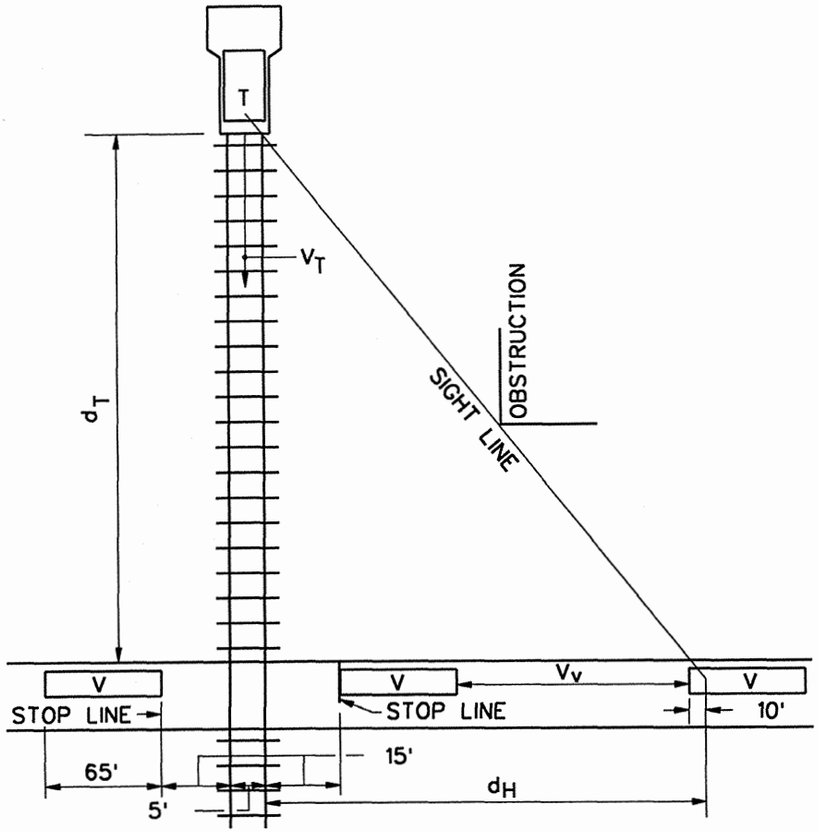
Desirably, the highway will be relatively level where it crosses the railroad. Where vertical curves are provided, they should meet the Department's criteria for vertical alignment presented in Chapter 4.

Figure 8-3C presents a minimum design for vertical alignment at railroad crossings to prevent low-clearance vehicles from bottoming out on the tracks. This design should be provided unless railroad track superelevation dictates otherwise.



PROFILE AT RAILROAD/HIGHWAY GRADE CROSSING

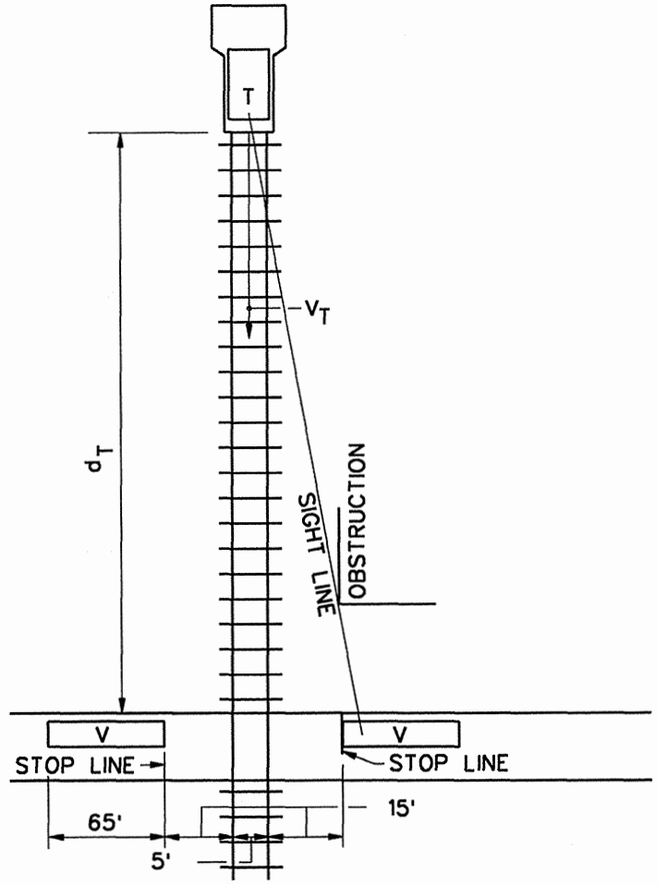
Figure 8-3C



d_T = *sight distance leg along the railroad tracks to permit the maneuvers described for d_H (feet)*
V_T = *velocity of train (mph)*
d_H = *sight distance leg along the highway allowing a vehicle proceeding to speed V_V to cross tracks safely even though a train is observed at a distance d_T from the crossing or to safely stop the vehicle without encroachment of the crossing area (feet)*
V_V = *velocity of vehicle (mph)*

CASE A: APPROACHING VEHICLE TO SAFELY CROSS OR STOP AT RAILROAD CROSSING

Figure 8-3A



d_T = *sight distance along railroad tracks (feet)*
V_T = *velocity of train (mph)*

CASE B: DEPARTURE OF VEHICLE FROM STOPPED POSITION TO CROSS SINGLE RAILROAD TRACK

Figure 8-3B

Table 8-3A

SIGHT DISTANCE REQUIREMENTS FOR RAILROAD/HIGHWAY GRADE CROSSINGS

Train Speed (mph)	Case B Departure from Stop	Case A Moving Vehicle						
		Design Speed (mph)						
	0	10	20	30	40	50	60	70
	Distance Along Railroad from Crossing, d_T(ft)							
10	240	145	103	99	103	112	122	134
20	480	290	207	197	207	224	245	269
30	719	435	310	296	310	337	367	403
40	959	580	413	394	413	449	489	537
50	1200	725	517	493	517	561	611	671
60	1439	870	620	591	620	673	734	806
70	1679	1015	723	690	723	786	856	940
80	1918	1160	827	789	827	898	978	1074
90	2158	1305	930	887	930	1010	1101	1209
		Distance Along Highway from Crossing, d_H(ft)						
		69	132	221	338	486	659	865

Note: Values apply to a 65-ft truck crossing a single set of tracks at approximately 90° on grades of 3% or less.