Provincial Railway Guides

Public Grade Crossings – RTS2001

General

The standards and requirements listed in this document are intended for use on provincially regulated railway public grade crossings. These standards are considered the minimum requirements to which public grade crossings should be maintained. This standard generally adopts the standards and requirements outlined in the federal *Grade Crossing Regulations*, *Grade Crossing Standards* and *Grade Crossing Handbook.* The federal regulations and standards should be consulted and followed if further detail is required.

The requirements and specifications noted in this document for existing medium-priority public grade crossings will be mandatory on November 28, 2024. It is not mandatory for low-priority crossings to meet all provisions in these standards, however, it is recommended that railways and road authorities use the standards as a best-practices maintenance guideline for low priority crossings.

The Ministry of Highways will conduct routine inspections of all provincially regulated public grade crossings on an ongoing basis. Recommendations for improvements will be issued to railways if low or medium priority crossings are found to be non-compliant with these standards. After November 28, 2024, binding corrective action orders will be issued by provincial railway inspectors to railways to address any deficiencies found on medium priority crossings.

The federal *Grade Crossing Regulations* require high-priority crossings to meet the standards by November 28, 2022. Currently, there are no crossings on the provincially regulated railway network that meet the definition and characteristics of a high priority crossing. In the event high priority crossings are constructed, become part of the provincial jurisdiction or a medium priority crossing is upgraded to high priority, a comprehensive crossing safety assessment will be completed on each high priority crossing and corrective action orders will be issued to address any deficiencies.

A provincial railway inspector may make orders to correct immediate or serious safety concerns to bring any public grade crossings into compliance with these standards regardless of priority classification or compliance timeframe.

It is mandatory that any new or relocated public grade crossing regardless of priority be designed and constructed in accordance with all the requirements and specifications outlined in the federal Grade Crossing Standards.

Section 1 – Definitions

Average Annual Daily Railway Movements: means the number of movements of engines or engines coupled with railway equipment, across a grade crossing in a year, divided by the number of days in that year.

Average Annual Daily Traffic: means the number of motor vehicles that cross a grade crossing in a year, divided by the number of days in that year.

Clearance Distance (cd): is defined as the distance, in metres (m), between the departure point in advance of the grade crossing, to the clearance point beyond the farthest rail, as shown in Section 6.4.

Crossing Surface: means the part of the road that lies between the ends of a railway tie and that has the width as shown in Figure 3.1.

Crossing User: means drivers of vehicles, pedestrians, cyclists and persons using assistive devices.

Cross-Product: means the product of the average annual daily railway movements and the average annual daily traffic of vehicles on the road that pass across the grade crossing.

Existing Grade Crossing: means a grade crossing for which actual construction was started before January 1, 2016.

Field Side Gap: means the space between the outside of the rail and the travelled surface at a grade crossing.

Grade Crossing: means an at-grade crossing and intersection of a railway and a highway, road, street, or lane.

New Grade Crossing: means a grade crossing for which actual construction was started on or after January 1, 2016.

Public Grade Crossing: means a grade crossing intended for or used by the general public for the passage of vehicles or pedestrians.

Road Approach Gradient: is the average gradient over the stopped sight distance (SSD).

Road Authority: means the public authority (municipal or provincial government, department, or agency) responsible for the direction, control and management of a road that crosses a provincial railway line.

Stopped Sight Distance: is the minimum SSD along the road approach that a crossing user needs to react to approaching railway equipment.

Travelled Way: means that part of a road intended for vehicular use, excluding shoulders.

Storage Distance: means, on a road that crosses a grade crossing, the shortest distance between the rail nearest the road approach of the grade crossing and the edge of the nearest intersecting road, measured along the centre line of the road, as represented by D in Figure 1.1 below.

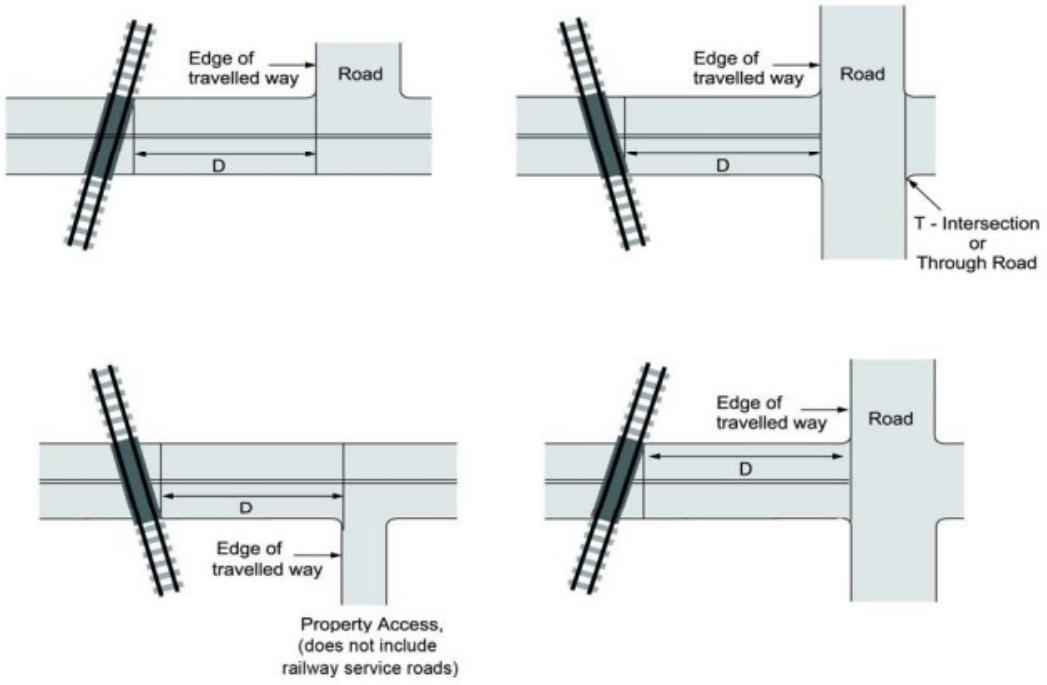


Figure 1.1 – Location of Grade Crossings

Section 1.1 – Grade Crossing Priority

1.1.1 High-priority

A “high-priority grade crossing” is a public grade crossing that’s used by at least 10 trains a day and with a railway design speed of 97 kilometres/hour (km/h) (60 miles/hour (mph)) or more. High priority crossings must meet the standards by November 28, 2022.

If a crossing’s characteristics change and is deemed to be high-priority after 2022, it will need to meet the requirements of the standards immediately.

1.1.2 Low-priority

A “low-priority grade crossing” is a public grade crossings that’s used by no more than three trains per day, the railway design speed is 17 km/h (10 mph) or less, no more than one track crosses the grade crossing, the storage distance (the shortest distance between closest rail to the crossing’s road approach and edge of the nearest intersecting road, measured along the center line of the road) is 30 m or more, whistling is required or allowed when railway equipment approaches the grade crossing, and the cross-product (average annual daily railway movements multiplies the average annual daily traffic) is less than 2,000.

1.1.3 Medium-priority

A “Medium-priority grade crossing” is a public grade crossing that is not defined by Section 1.1.2 or 1.1.3. If a crossing’s characteristics change and is deemed to be of medium priority, it will need to meet the requirements of the regulations by November 28, 2024.

Section 2 – Information Sharing and Responsibility for Maintenance

In order to determine the appropriate standards and requirements for individual grade crossings, railways and road authorities should share information and determine the design aspects for each grade crossing. If a railway and road authority share the following information with each other, it is recommended that the information also be provided to the Transportation Programs and Services Unit so that the design information can be incorporated and used in the Ministry of Highways (MoH) and grade crossing inspection program.

In the absence of any formal information sharing notification, the MoH will assume and set the design criteria for each individual grade crossing. Based on this information, the MoH will inspect each grade crossing and issue corrective action orders as part of the MoH's ongoing public grade crossing inspection programs.

The duties and responsibilities noted below regarding construction and maintenance are not reflective of responsibility for cost apportionment. It is recommended that railways and road authorities enter crossing maintenance agreements that establish each party's responsibilities for construction, maintenance and related ongoing cost apportionment.

Subsection 2.1 - Responsibilities of Railways

If requested by the road authority, a railway company must provide a road authority, in writing, with the following information in respect of a public grade crossing:

- The precise location of the grade crossing.
- The number of tracks that cross the grade crossing.
- The average annual daily railway movements.
- The railway design speed.
- The warning system in place at the grade crossing.
- An indication of whether a Stop sign is installed on the same post as the Railway Crossing sign.
- An indication of whether whistling is required when railway equipment is approaching the grade crossing.

For the purpose of ensuring crossings meet and will continue to comply with the standards, railways are typically responsible for:

- Installation and maintenance of a Railway Crossing sign, a Number of Tracks sign and an Emergency Notification sign.
- The maintenance of a stop sign that is installed on the same post as a Railway Crossing sign. The decision to install a stop sign on a railway crossing sign must be approved by both the railway and the road authority, or alternatively ordered to be installed by a provincial railway inspector.

- The installation and maintenance of a warning system if warranted.
- The installation and maintenance of a crossing surface, other than its design.
- Ensuring sightlines within the railway right-of-way and over land adjoining the railway right-of-way meet the standards, including the removal of trees and brush that obstruct the sightlines.

Subsection 2.2 - Responsibilities of the Road Authority

If requested by the railway, a road authority must provide to the railway, in writing, with the following information in respect of a public grade crossing:

- The precise location of the grade crossing (road/street name, geographic coordinates or legal land description).
- The number of traffic lanes that cross the crossing surface.
- The average annual daily traffic.
- The road crossing design speed.
- The road classification (as defined in Transport Canada's Grade Crossing Standards).
- The width of each traffic lane and shoulder on the road approach.
- The design vehicle.
- The SSD.
- The average gradient of the road approach.
- The crossing angle measured between the centreline of the road and the centreline of the railway.
- The applicable departure time (the greater of the time required for the design vehicle to pass completely through the cd from a stopped position or the time required for pedestrians, cyclists and persons using assistive devices to pass completely through the cd).
- The activation time for any active advance warning sign (prepare to stop warning system) that is interconnected to a railway warning system.
- The activation time for any traffic signals that are interconnected to a railway warning system.
- An indication of whether the grade crossing includes a sidewalk, path or trail, and if so, whether the sidewalk, path or trail has been designated for persons using assistive devices.

For the purpose of ensuring crossings meet and will continue to comply with the standards, road authorities are typically responsible for:

- The design, construction and maintenance of a road approach.

- The design, construction and maintenance of traffic control devices, except for the maintenance of a Stop sign that is installed on the same post as a Railway Crossing sign. The decision to install a stop sign on a railway crossing sign must be approved by both the railway and the road authority, or alternatively ordered to be installed by a provincial railway inspector.
- The design of a crossing surface.
- Ensuring sightlines within the land on which the road is situated and over land in the vicinity of the grade crossing, including the removal of trees and brush that obstruct the sightlines.

Section 3 - Crossing Surface Requirements for All Existing and New Crossings

The crossing surfacing material must provide for a structurally sound surface and must be securely fastened to prevent movement or removal.

The crossing surface of a grade crossing must be smooth and continuous.

Subsection 3.1 - Crossing Surface Width

The crossing surface must be of a width that is equal to the travelled way and shoulders of a road, plus 0.5 m on each side, measured at right angles to the centerline of the road as shown in Figure 3.1 (a) below for roadways with or without shoulders. Figure 3.1 (b) shows the grade crossing surface dimensions for sidewalks, paths or trails.

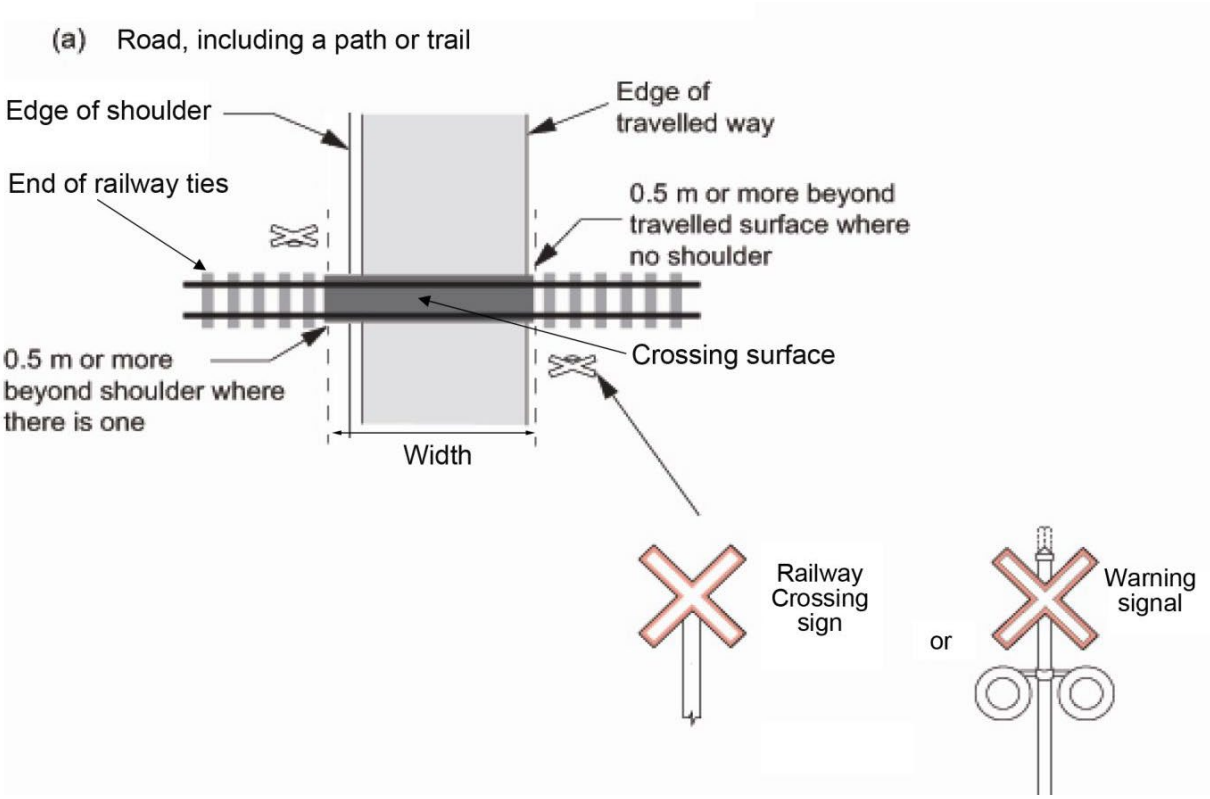


Figure 3.1(a) – Crossing Surface Dimensions

(b) Sidewalk, path, or trail along a road

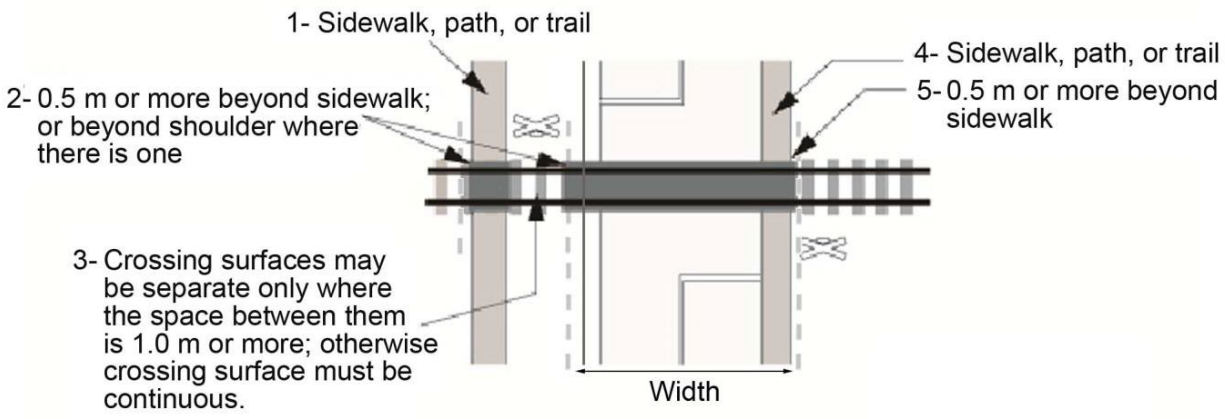


Figure 3.1(b) – Crossing Surface Dimensions for sidewalks

Subsection 3.3 - Grade Crossing Flangeways

A flangeway (shown in Figure 3.2) must be provided on all crossings between the gauge side of the rail and the road surface and must be within the tolerances noted in Table 3.1 below.

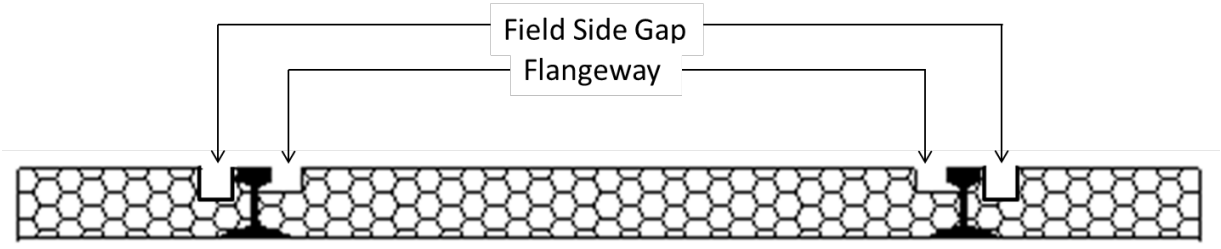


Figure 3.2 Crossing Surface Section of the Roadway Travelled Way

		Distance in mm
Flangeway Width	Minimum	65
	Maximum	120
Flangeway Depth	Minimum	50
	Maximum	N/A
Wear Limit		25

Table 3.1- Flangeway and wear limit dimensions

Wear limit means the maximum distance of the top of the rail above or below the crossing surface. The top of the crossing surface must be installed as close as possible to the top of the rail.

Subsection 3.4 - Grade Crossings in Rural locations

A field side gap of a maximum 120 millimetres (mm) wide is permitted only at rural locations. A field side gap is not permitted in urban locations and at grade crossings with access for persons using assistive devices.

Subsection 3.5 - Grade Crossings with access for persons using assistive devices

A flangeway and crossing surface must be provided on all crossings for all public sidewalk, path or trail designated by the road authority for use by persons using assistive devices within the limits in table 3-2

		Distance in mm
Flangeway Width	Minimum	65
	Maximum	75
Flangeway Depth	Minimum	50
	Maximum	75
Wear Limit (with side walks)	Maximum (top of rail vs road surface)	13 above or 7 below
Public grade Crossing Max and Min surface distance of the Top of Rail		25

Table 3-2- Flangeway and wear limit dimensions for crossings designated for persons using assistive devices

Section 4 - Railway Crossing Signs and Roadway Control Signs

Subsection 4.1 - Requirements for all Public Grade Crossings

All public grade crossings (Low, Medium and High Priority) must have a Railway Crossing Sign providing warning of a grade crossing as shown in Figure 4.1 and must have:

- A retroreflective coating that covers the entire front surface of the sign.
- A 50 mm border on the front of each blade, with transparent red ink silk-screen processed over silver-white sheeting material.

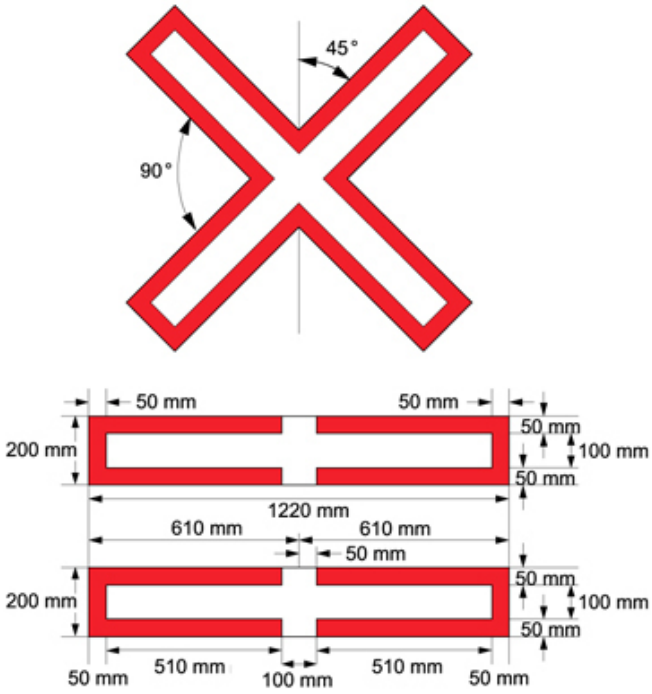


Figure 4.1 – Railway Crossing sign dimensions

A sign indicating the number of tracks (Number of Tracks sign) at a grade crossing where there is more than one track must be as shown in Figure 4.2 and must:

- Have a retroreflective coating that covers the entire front surface of the sign.
- Have a digit that shows the Number of Tracks and symbol that is transparent red or black inked silk-screened processed.
- Be installed on the supporting post of each Railway Crossing Sign as shown in Figure 4.3.

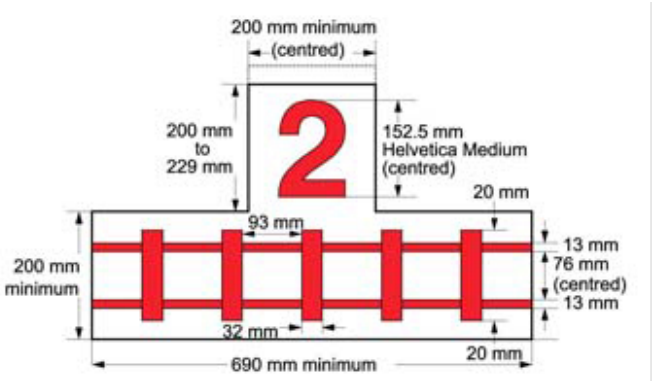


Figure 1.2 – Number of Tracks sign

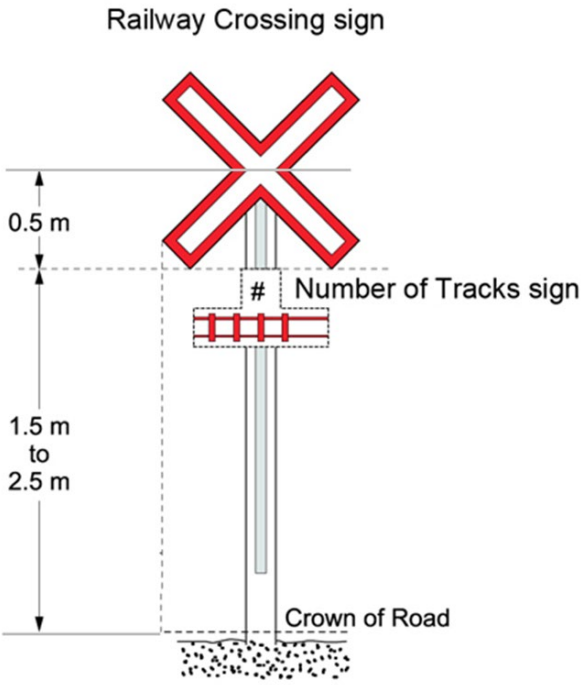


Figure 4.3 Railway Crossing Sign

Subsection 4.2 - Railway Crossing Sign Placement

Any new crossing constructed must meet these standards. Medium and high priority crossings must comply with this standard within the general timeframe for compliance (November 2022 or November 2024).

Any existing low priority crossing should attempt to meet these standards outlined in Subsection 4.2. When replacing low priority crossing signs, the post locations should be adjusted to ensure compliance.

Subsection 4.2.1 - Railway Crossing Sign Placement (Crossings without Warning Systems)

The Railway Crossing Sign must be located between 0.3 m and 2.0 m from the face of the curb to the clearance line, or the outer edge of the road shoulder or, where there is no curb or shoulder, 2.0 m to 4.5 m from the edge of the travelled way to the clearance line.

The Railway Crossing sign must not be located closer than three (3) m measured to the nearest rail, as shown in Figure 4.4 (a) and 4.4 (b). The railway crossing signs must be clearly visible to persons approaching the grade crossing on the road approach.

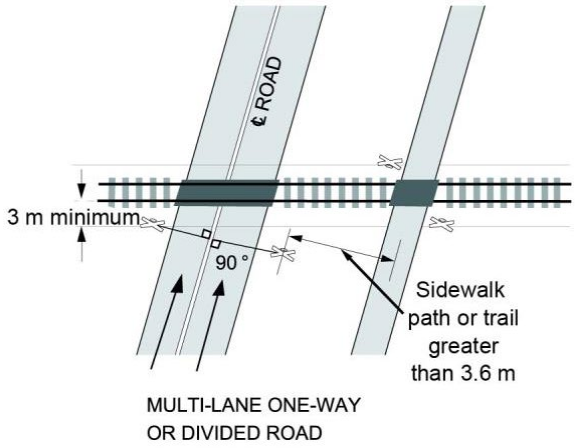


Figure 4.4(a) – Railway Crossing and Number of Tracks signs placement

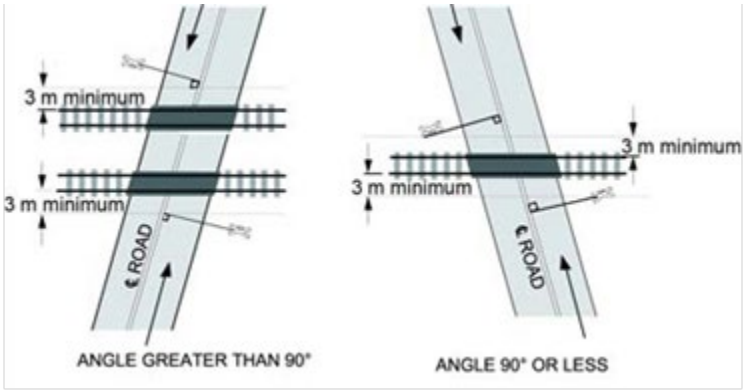


Figure 4.4(b) – Railway Crossing and Number of Tracks signs placement

Subsection 4.2.2 - Railway Crossing Sign Placement (Crossings with Warning Systems)

This section pertains to placement of new or modified warning system assemblies and signs in relation to the travelled roadway. Further detail on warning system standards and requirements continues in Section 7.

A grade crossing with a warning system must have the following:

- A railway crossing sign must be installed as shown in Figures 4.5 and 4.6.
- Where there is more than one track at a grade crossing, a sign indicating the number of tracks to be crossed, as shown in Figure 4.2, must be installed on the supporting post of each railway crossing sign.

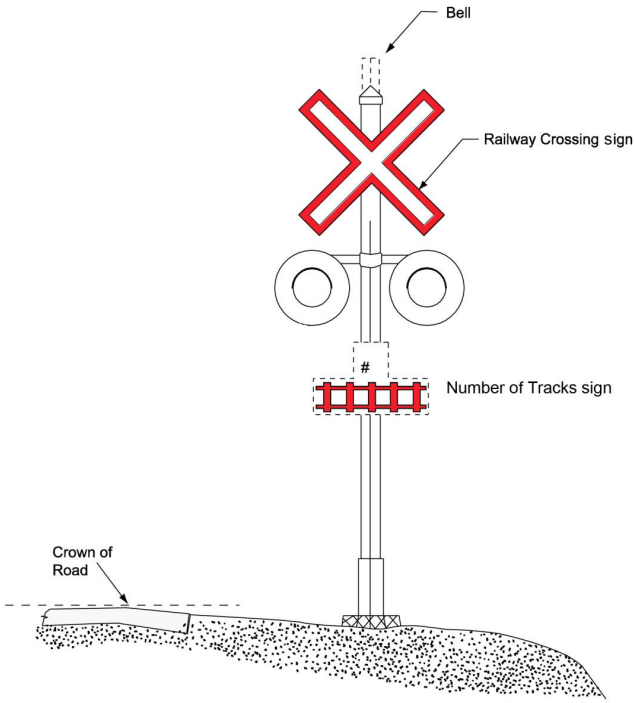


Figure 4.5 – Railway Crossing Sign and Number of Tracks Sign on a Grade Crossing Warning Signal of Flashing Light Type

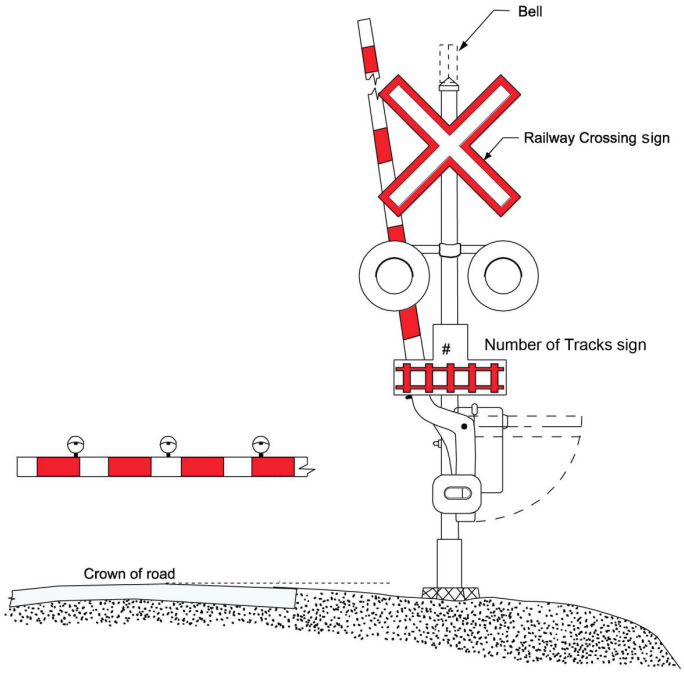


Figure 4.6 – Railway Crossing Sign and Number of Tracks Sign where Gates at a Grade Crossing

Signal assemblies for new or modified warning signals must be as shown in Figure 4.7(a), and gate assemblies must be as shown in Figure 4.8 and the, and must meet the following specifications:

- The minimum clearance distance from the face of a curb to the clearance line must be 625 mm (2 ft);
- Where there is no curb, the minimum clearance distance must be 1.875 m (6ft) from the edge of the travelled way to the clearance line and a minimum of 625 mm (2 ft) from the outer edge of the road approach shoulder to the clearance line, if there is a shoulder as shown in Figure 4.7(a), 4.7(b) or 4.7(c)

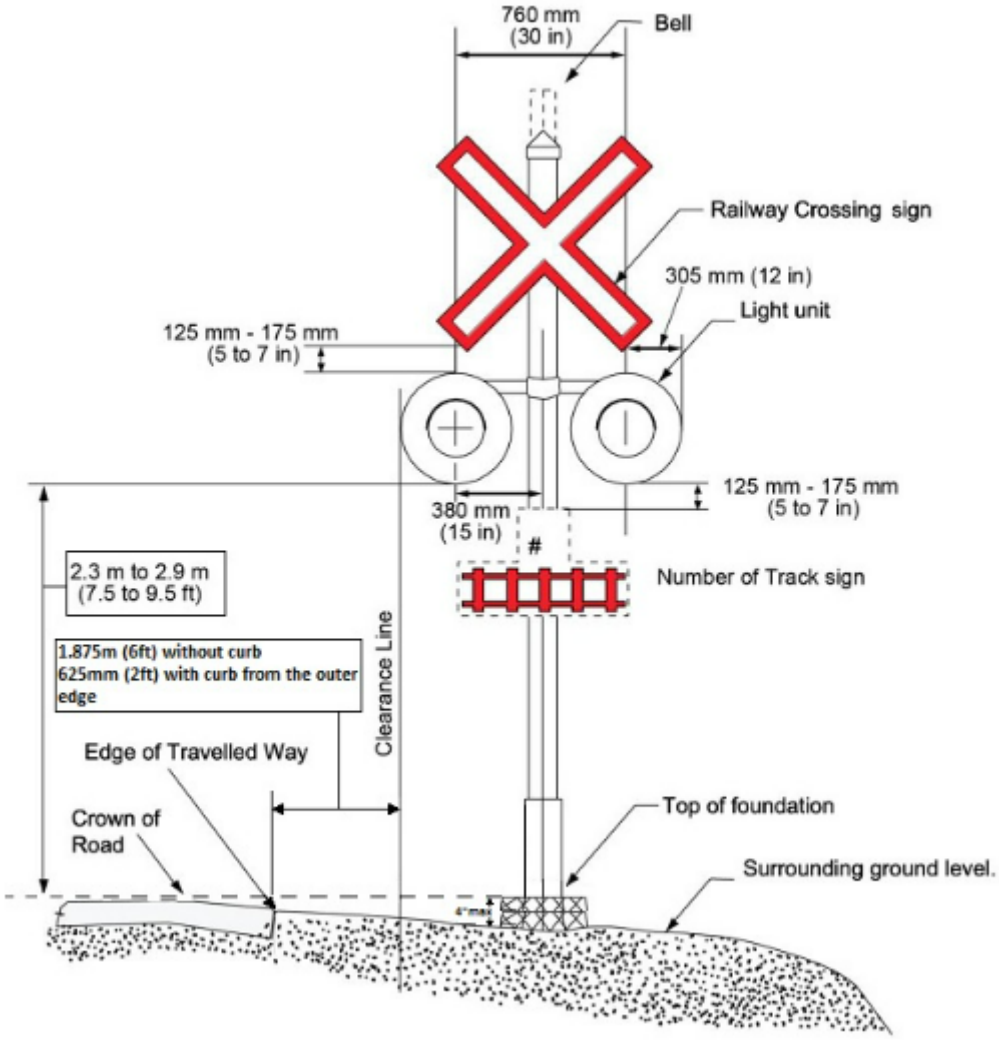


Figure 4.7(a) – Warning Signal Assemblies

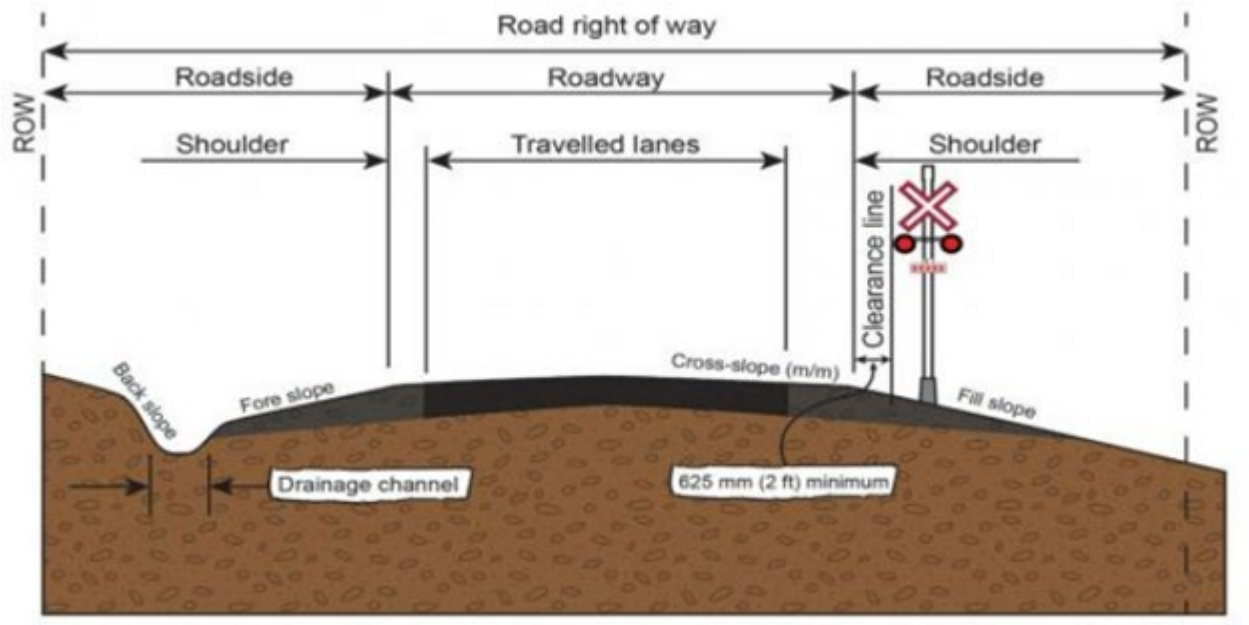


Figure 4.7(b) – Warning Signal Assemblies (with shoulder)

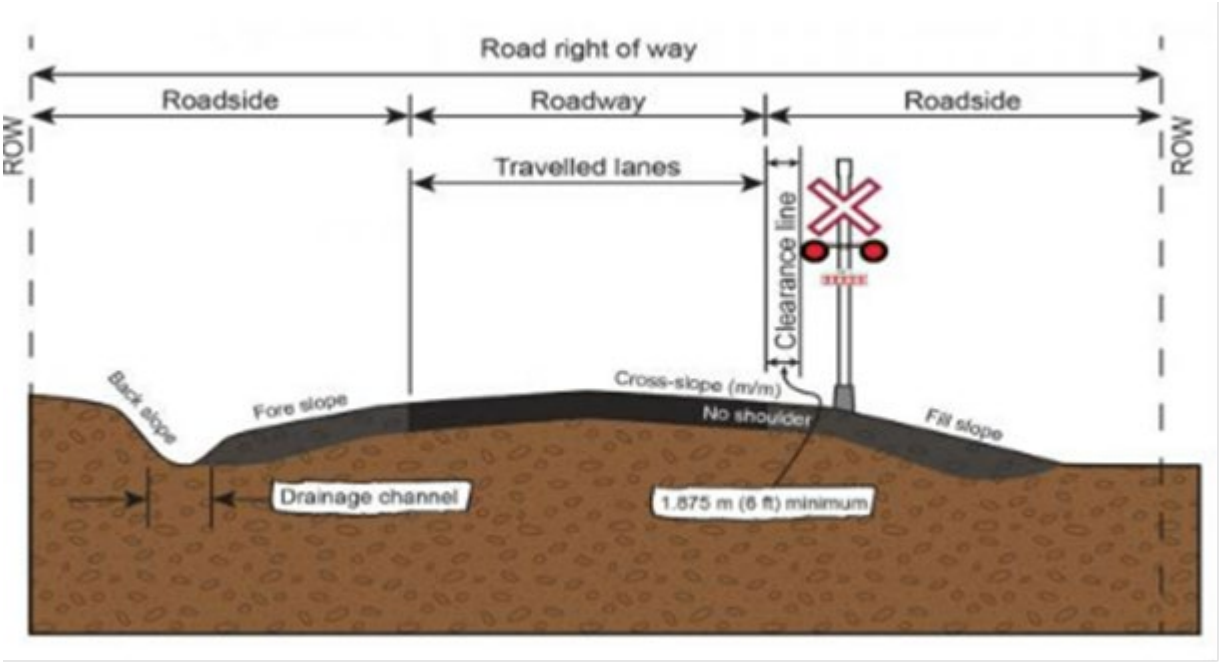


Figure 4.7(c) – Warning Signal Assemblies (with no shoulder)

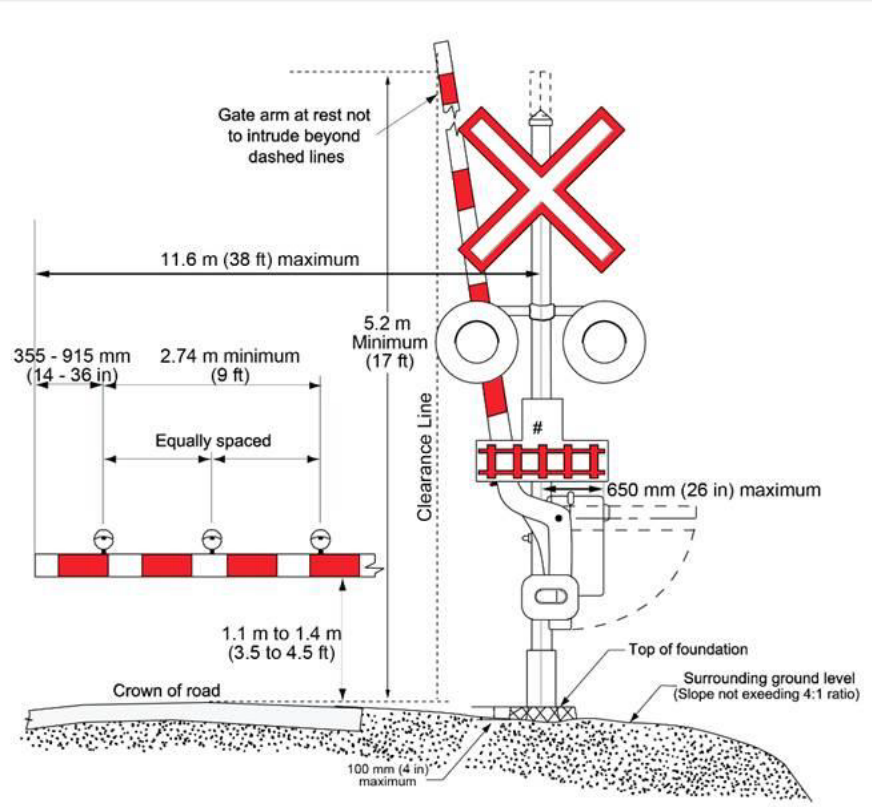


Figure 4.8 – Gates

New or modified cantilever light unit assembly's clearance must be as shown in Figure 4.9.

Except on a one-way road where a second warning signal is installed on the left side of the lane, a cantilevered light unit must be provided in a warning system if:

- The distance between the centre of a warning signal mast and the edge of the lane of the road that is the farthest from the mast, measured perpendicular to the road, exceeds 7.7 m for DR, and 8.7 m for DL as shown in Figure 4.10(a) or 4.10(b).
- The front light units of the warning signal (i.e., those on the same side of the track as approaching traffic) are not clearly visible within the distance for the set of light units.

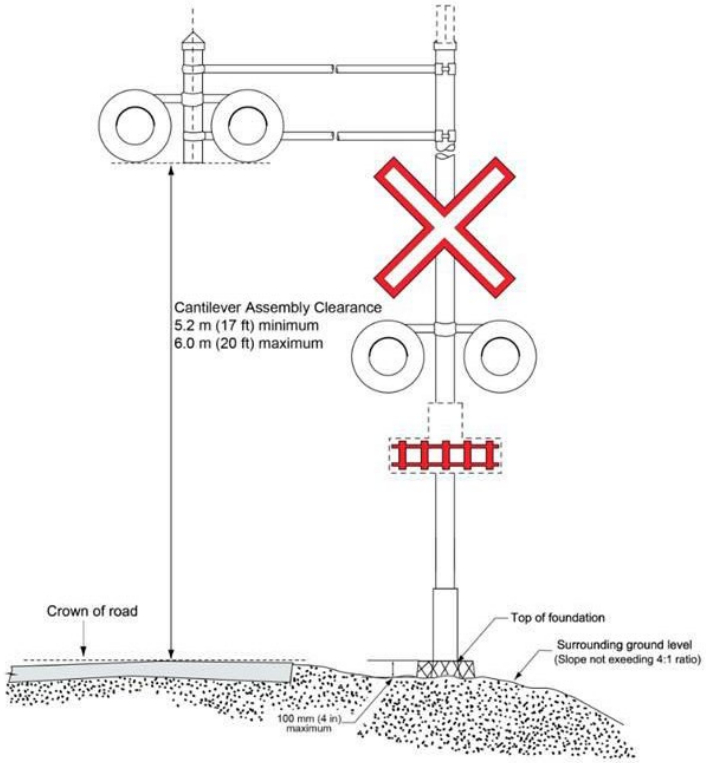


Figure 4.9 – Cantilevers

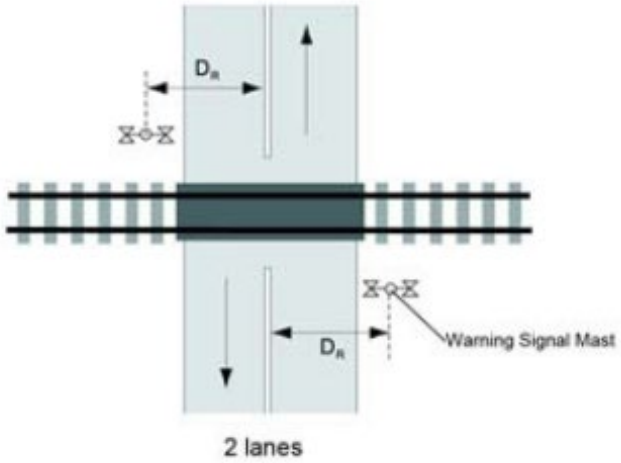


Figure 4.10(a) – two lane traffic with wrning system mast

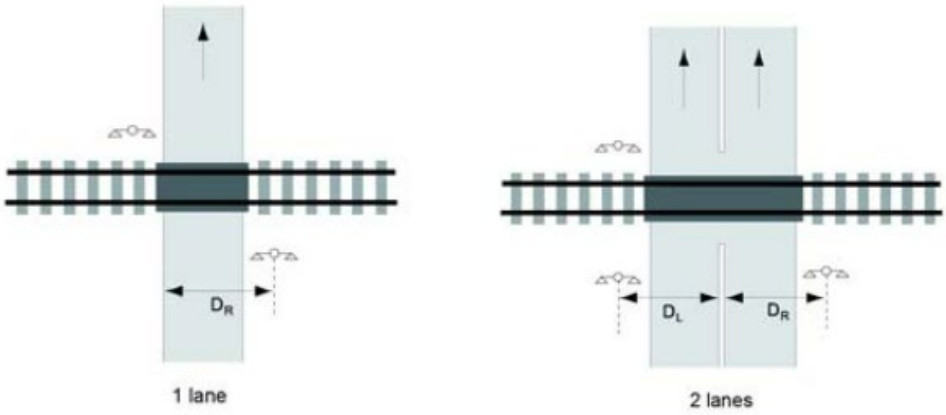


Figure 4.10(b)– One-Way or Divided Road

Subsection 4.3 - Additional Supporting Post Requirements for New, Modified or Replaced Medium and High Priority Grade Crossings Without Warning Systems

The supporting post, on which is installed the Railway Crossing sign and the Number of Tracks sign, must be of such construction that an 820 kilogram vehicle striking it at speeds of 32 km/h or more, will not have a change in velocity greater than 4.57 m. This requirement does not apply to a Railway Crossing sign installed on the mast of a warning system.

Subsection 4.4 - Additional Reflective Material Requirements for New, Modified or Replaced Medium and High Priority Grade Crossings Without Warning Systems

A 100 mm retroreflective strip must be applied on the back of each blade of the Railway Crossing Sign, for the full length of each blade, as shown in Figure 4.11.

A 50 mm strip of silver-white sheeting must be applied on the front and back of the supporting post, extending from no higher than 300 mm above the crown of the adjacent road surface to 70 mm above the center of the Railway Crossing sign as shown in Figure 4.11.

Further to applying the additional reflective material requirements to new grade crossing construction, it is also recommended that railways ensure that the additional reflective strips noted above are added to back of the Railway Crossing sign and supporting posts upon repair or replacement of a Railway Crossing sign.

Retroreflective material referred to in this section, and for new or replacement railway crossing signs must meet the specifications for Type IV material, white sheeting, as specified in Sections 4.2.4 and 6.1.4 of American Society for Testing and Materials (ASTM) D4956 when tested in accordance with the Test Methods for Type IV material specified in Sections 7 and 9 of that Standard.

The retroreflective coefficient of the retroreflective material is to be maintained above 50 per cent of the value specified for Type IV material specified in article 6.1.4 of ASTM D4956.

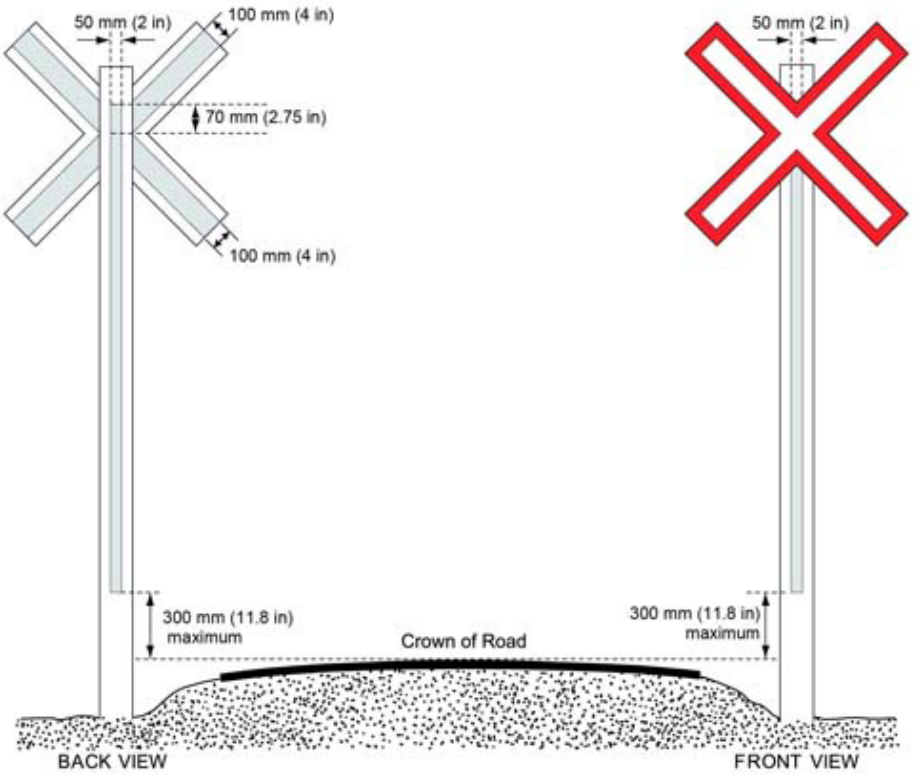


Figure 4.11 – Retroreflective material configuration

Subsection 4.5 - Railway Crossing Ahead Sign and Advisory Speed Tab Sign

A Railway Crossing Ahead sign with an advisory speed tab sign must be installed if:

- The railway crossing sign is not clearly visible within the SSD.
- The speed of the motor vehicle on the road approach needs to be reduced in order to correspond to the crossing design speed.

If required, a sign providing advanced warning of a grade crossing (Railway Crossing Ahead sign) must be as specified in Section 500 WA-18 in the *Saskatchewan Traffic Control Devices Manual* (TCDM) and must meet the applicable standards from that manual as well as applicable specifications from TCDM 304 – Placement Distance.

Speed reduction signs installed in conjunction with crossing ahead signs must comply with WA-7S as shown in TCDM 501 or a regulatory speed limit sign as determined appropriate by the road authority.

Interconnected traffic control devices connected to a grade crossing warning system (active advance warning systems, prepare to stop at railway crossing signs or traffic signals) should be designed, installed and maintained in accordance with Section 18,19 and 20 of the federal *Grade Crossing Standards*.

Subsection 4.6 - Stop Sign

A Stop sign must be installed at a grade crossing without a warning system if the road crossing design speed is less than 15 km/hr.

As an alternative to installing Railway Crossing Ahead signs and advisory speed tab signs, a railway and road authority may agree to install a Stop sign at any grade crossing where the road crossing design speed is less than the posted speed limit.

A railway may only place a Stop sign at a grade crossing without the approval of the road authority if ordered to do so by a provincial railway inspector or the minister.

A Stop sign must be as shown in Section 400 RA-01 in the *Saskatchewan Traffic Control Devices Manual*.

When a Stop sign is installed on the same post as a Railway Crossing sign, it must be installed as shown in Figure 4.12.

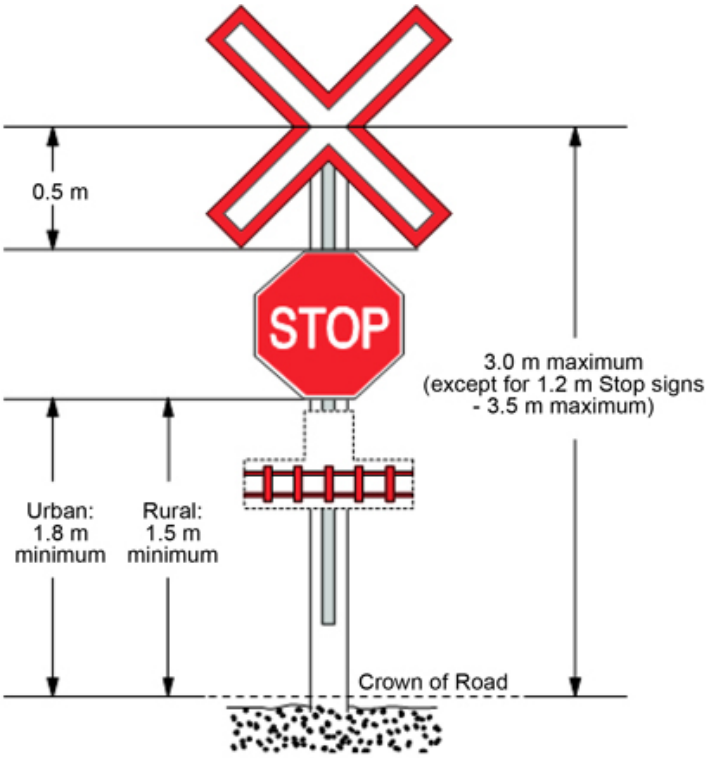


Figure 4.12 – Stop sign installed on the same post as the Railway Crossing sign

Subsection 4.7 - Stop Ahead Sign

A Stop Ahead sign must be installed if the Stop sign is not clearly visible within the SSD.

A Stop Ahead sign (WB-01) must be as shown in Section 501 - *Sign Types and Reference Numbers Listing by Code* in the *Saskatchewan Traffic Control Devices Manual* and must meet the applicable standards from that manual as applicable specifications from TCDM 304 –Placement Distance.

Subsection 4.8 – Low Ground Clearance at Railway Crossing Sign

A Low Ground Clearance at Railway Crossing sign may be used as needed at railway grade crossings to notify drivers that they are approaching a low clearance grade crossing to prevent vehicles with low ground clearance or long wheelbase to become high-centered or damaged at the grade crossing.

A Low Ground Clearance at Railway Crossing sign symbol must be as shown in the W10-5 image in Figure 8B-4 in Part 8 of the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* and must meet applicable specifications from TCDM 304 –Placement Distance.

Subsection 4.9 - Emergency Notification Information

An Emergency Notification sign that provides information on the location of the grade crossing and the railway company's emergency telephone number must be installed parallel to the road or on each side of the grade crossing, facing traffic approaching the grade crossing. The Emergency Notification sign must be clearly legible.

Subsection 4.10 – Other Discretionary Signage

Discretionary signage may be installed as ordered or approved by a provincial railway inspector.

Section 5 - Road Geometry for Existing Low, Medium or High Risk Crossings

The horizontal and vertical alignment of the road approach and the crossing surface must be smooth and continuous at all grade crossings.

The absolute gradient of a road approach to an existing grade crossing shall not be increased.

If the approach gradient or road profile at an existing low, medium or high-risk crossing is altered, the new road geometry must meet the complete road geometry requirements in the federal Crossing Standards.

Any new or relocated low, medium or high-risk grade crossing must be designed and constructed to meet the road geometry requirements in the federal Grade Crossing Standards.

Section 6 - Sightlines

Sightlines must be maintained as per the requirements listed in this section.

Subsection 6.1 - Determination of sightline requirements

Sightlines are measured from a point 1.05 m above the road surface to a point 1.2 m above the top of the lowest rail.

Medium Priority and High Priority Public grade crossings without a warning system must meet the requirements for D_{SSD} and $D_{STOPPED}$ as shown in Figure 6.1 and Figure 6.2, respectively:

- Where D_{SSD} is the minimum distance along the line of the railway (in both directions) that a crossing user needs to see approaching railway equipment from the SSD point. D_{SSD} is equal to the distance required for the design vehicle at its road crossing design speed to go from the SSD completely past the clearance point on the other side of the grade crossing.
- Where $D_{SOTPPED}$ is the minimum distance along the line of a public grade crossing that a user needs to see approaching railway equipment, from the stopped position, and safely cross over the public grade crossing.

Public grade crossings with a stop sign must meet the requirements of $D_{STOPPED}$ as shown in Figure 6.1.

Public grade crossings with a warning system without gates must meet the requirements for $D_{STOPPED}$ as shown in Figure 6.1.

Sightline requirements in this standard do not apply to grade crossings with warning systems with a gate.

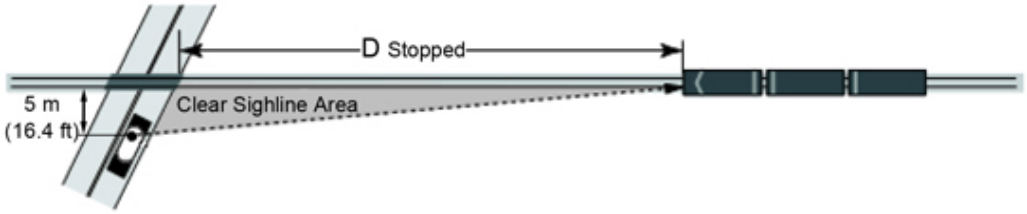


Figure 6.1 – Sightline for the stopped condition

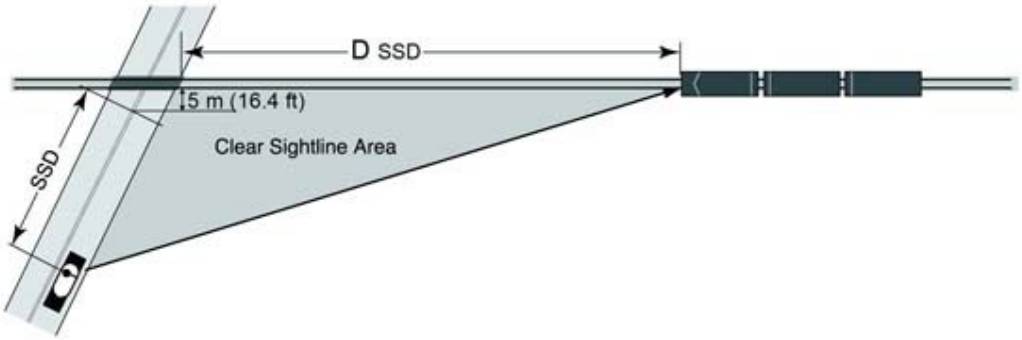


Figure 6.2 – Sightline for travelling vehicles

Subsection 6.2 - Determining SSD

Table 6.1 may be used to determine passenger car or truck class SSD.

Road Crossing Design Speed (km/hr)	Road Approach Gradient																				
	-10%	-9%	-8%	-7%	-6%	-5%	-4%	-3%	-2%	-1%	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
20	21	21	21	21	21	21	20	20	20	20	20	20	20	20	20	20	19	19	19	19	19
30	33	33	32	32	32	31	31	31	30	30	30	30	30	29	29	29	29	29	29	28	28
40	51	50	49	49	48	48	47	46	46	45	45	45	44	44	43	43	43	42	42	42	42
50	76	75	73	72	71	70	69	68	67	66	65	64	63	63	62	61	61	60	60	59	59
60	104	101	99	97	95	93	91	89	88	86	85	84	83	81	80	79	78	77	77	76	75
70	140	135	132	128	125	122	119	117	114	112	110	108	106	105	103	101	100	99	97	96	95
80	182	176	171	166	161	157	153	149	146	143	140	137	135	132	130	128	126	124	122	121	119
90	223	216	209	202	197	191	186	182	178	174	170	167	163	160	157	155	152	150	148	145	143
100	281	271	262	253	245	238	232	226	220	215	210	205	201	197	194	190	187	184	181	178	175
110	345	331	318	307	296	287	278	270	263	256	250	244	239	234	229	224	220	216	307	209	205

Table 6.1 – Stopping Sight Distances (level grade, on wet pavement)

The distances provided in Table 6.1 are determined using the following formula:

SSD = 0.278 X 2.5 X V + d (m)
d = braking distance (m) = $V^2/254(f +/- G)$
V = initial speed (km/h) or maximum road operating speed (km/h)
f = coefficient of friction between tires and the roadway (Table 6.2)
G = the percent grade divided by 100 (up is positive, down is negative, as observed from SSD)

Maximum Road Operating Speed (km/h)	Coefficient of Friction (f)
0 – 30	0.40
31 – 40	0.38
41 – 50	0.35
51 – 62	0.33
63 – 69	0.31
70 – 76	0.30
77 – 84	0.30
85 – 90	0.29
91 – 97	0.28
98 – 120	0.28

Table 6.2 – Stopping Sight Distances (level grade, on wet pavement)

Subsection 6.3 - Determining D_{SSD}

D_{SSD} is the minimum distance along the line of railway that a crossing user must see approaching railway equipment from the stopping sight distance, and does not apply if the grade crossing is equipped with a Stop sign or warning system.

The values provided in Table 6.3 can be used as the D_{SSD}.

Railway Design Speed (mph)	T_{SSD} (s)											If TSSD > 20 seconds, add this length for each additional second (m)
	≤10	11	12	13	14	15	16	17	18	19	20	
	D_{SSD} (m)											
STOP	30	30	30	30	30	30	30	30	30	30	30	0
1-10	45	50	55	60	65	70	72	76	80	85	90	5
11-20	90	100	110	120	125	135	145	155	165	170	180	10
21-30	135	150	165	175	190	205	215	230	245	255	270	15
31-40	180	200	220	235	250	270	285	305	325	340	360	20
41-50	225	250	270	290	315	335	360	380	405	425	450	25
51-60	270	300	325	350	380	405	430	460	485	510	540	30
61-70	315	350	380	415	445	470	505	535	565	595	630	35
71-80	360	395	435	465	505	540	580	610	650	680	720	40
81-90	405	445	490	535	570	605	650	685	730	765	810	45
91-100	450	500	540	580	630	670	715	760	805	850	895	50

Table 6.3 – Minimum sightlines along the rail line

If the values provided in Table 6.3 do not suitably represent D_{SSD}, the following formula may be used to calculate D_{SSD}:

$D_{SSD} = 0.278 \times V_T \times T_{SSD}$ (m)
where V_T = railway design speed in km/h
where T_{SSD} = time required for the vehicle to travel the SSD and to completely pass the clearance distance.

T_{SSD} may be calculated using the following formulas:

$T_{SSD} = [(SSD + cd + L) / (0.278 \times V)]$ (s)
Where,
SSD = SSD (m);
cd = clearance distance (m);
L = length of the design vehicle (m). Commonly used length for general vehicle classes is 5.6 m for passenger vehicles or 25.0 m for B train trucks; and,
V = road crossing design speed (km/h).

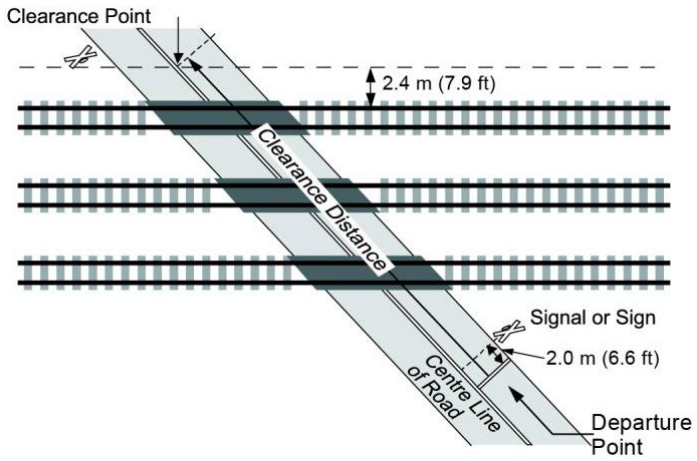
Clearance Distance

Clearance Distance (cd) is defined as the distance, in metres, between the departure point in advance of the grade crossing, to the clearance point beyond the farthest rail, as shown in Figure 6.3.

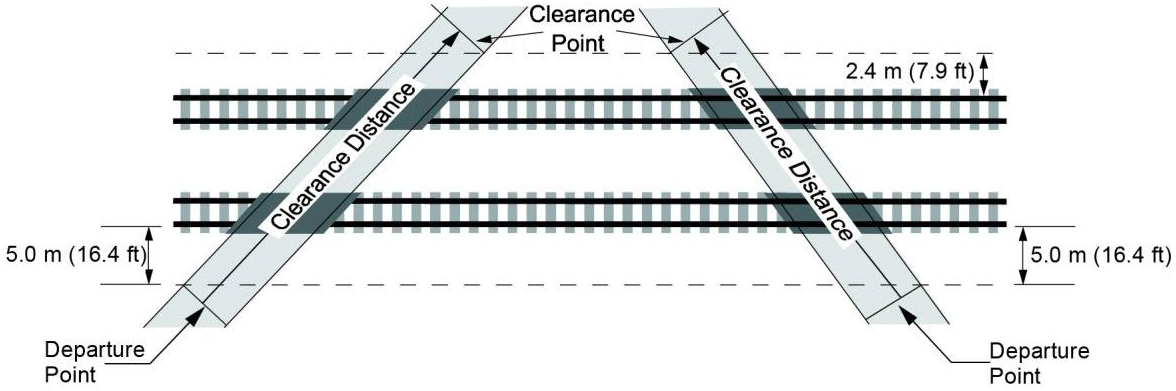
The clearance point is the point 2.4 m beyond the outside edge of the farthest rail from the departure point measured perpendicular to the rail.

Figure 6.3 – Clearance Distance (cd) for Grade Crossings

- For Grade Crossings with a Warning System or Railway Crossing Sign



- For Grade Crossings without a Warning System or Railway Crossing Sign



Vehicle Travel Distance

The total distance, in metres, the design vehicle must travel during acceleration to pass completely through the Clearance Distance (cd) is calculated using the following formula:

S = cd + L (m)
S = distance to travel to completely pass the clearance distance during the acceleration from a stopped position (m)
cd = clearance distance (m)
L = length of the design vehicle (m)

Subsection 6.4 - Determining $D_{Stopped}$

$D_{Stopped}$ is the minimum distance along the line of railway that a crossing user must be able to see approaching railway equipment from the stopped position at a grade crossing.

$D_{Stopped}$ is equal to the greater of the distances that railway equipment at the railway design speed will travel during

- The Departure Time for the grade crossing design vehicle, or
- The Departure Time for pedestrians, cyclists, and persons using assistive devices.

The time required for the pedestrian/cyclist/assistive device does not need to be considered if the crossing is not designated by the road authority for that purpose.

Table 6.4 may be used to determine $D_{STOPPED.}$ The departure time, $T_{STOPPED}$, is the greater of TD or TP.

Railway Design Speed (mph)	$T_{STOPPED}$ (s)											If $T_{STOPPED}$ > 20 seconds, add this length for each additional second (m)
	≤10	11	12	13	14	15	16	17	18	19	20	
	$D_{STOPPED}$ (m)											
STOP	30	30	30	30	30	30	30	30	30	30	30	0
1-10	45	50	55	60	65	70	72	76	80	85	90	5
11-20	90	100	110	120	125	135	145	155	165	170	180	10
21-30	135	150	165	175	190	205	215	230	245	255	270	15
31-40	180	200	220	235	250	270	285	305	325	340	360	20
41-50	225	250	270	290	315	335	360	380	405	425	450	25
51-60	270	300	325	350	380	405	430	460	485	510	540	30
61-70	315	350	380	415	445	470	505	535	565	595	630	35
71-80	360	395	435	465	505	540	580	610	650	680	720	40
81-90	405	445	490	535	570	605	650	685	730	765	810	45
91-100	450	500	540	580	630	670	715	760	805	850	895	50

Table 6.4 – Minimum sightlines along the rail line for the stopped condition

If the values provided in Table 6.4 do not suitably represent $D_{STOPPED}$, the following formula may be used to calculate $D_{STOPPED}$:

$D_{STOPPED} = 0.278 \times V_T \times T_{STOPPED}$ (m)
V_T = railway design speed (km/h); and,
$T_{STOPPED}$ = time required for the user to travel through S (s).

Departure Time - General

The Departure Time is the greater of the time required for the design vehicle to pass completely through the Clearance Distance (cd) from a stopped position (TD) or the time required for pedestrians, cyclists and persons using assistive devices to pass completely through the Clearance Distance (cd) (TP).

Table 10-1 Ratios of Acceleration Times on Grades must be used to account for the effects of road gradient on the design vehicle for the grade crossing. The established ratio of acceleration time (G) must be incorporated into the Acceleration Time (T) by multiplying the acceleration time on level ground (t) by the ratio of acceleration time (G).

Departure Time - Design Vehicle (TD)

The total time, in seconds, the design vehicle must travel to pass completely through the Clearance Distance (cd) is calculated using the following formula:

TD = J + T

where,

J = the perception-reaction time, in seconds, of the crossing user to look in both directions, shift gears, if necessary, and prepare to start (must use two (2) seconds at minimum).

T = the time, in seconds, for the grade crossing design vehicle to travel through the Vehicle Travel Distance taking into account the actual road gradient at the grade crossing.

T may be obtained through direct measurement or calculated using the following formula:

T = t x G

where,

t = the time, in seconds, required for the design vehicle to accelerate through the Vehicle Travel Distance (s = cd + L) on level ground established from Figure 6.4 Assumed Acceleration Curves.

G = the ratio of acceleration time established from Table 6.5 Ratios of Acceleration Times on Grade or may be obtained through direct measurement.

Grade Crossing Design Vehicle	Road Grade (%)				
	-4	-2	0	2	4
Passenger Car	0.7	0.9	1	1.1	1.3
Single Unit Truck & Buses	0.8	0.9	1	1.1	1.3
Tractor-Semitrailer	0.8	0.9	1	1.2	1.7

Table 1.5 – Ratios of acceleration times on grades

If this calculation of T_d is not suitably representative, tests or estimates for the ratio of acceleration times can be made. Additional time for T_d may be required depending on the number of tracks, surface roughness, super-elevation of the tracks, any unevenness created by the crossing angle or any restrictions on shifting gears while crossing tracks.

Departure Time – Pedestrians, Cyclists and Persons Using Assistive Devices (TP).

The time required for the pedestrian/cyclist/assistive device, TP, may be calculated using the following formula:

TP= cd / VP (s)
cd = clearance distance (m); and,
VP_p = average travel speed in m/s for pedestrians, cyclists and persons using assistive devices to a maximum value of 1.22 m/s.

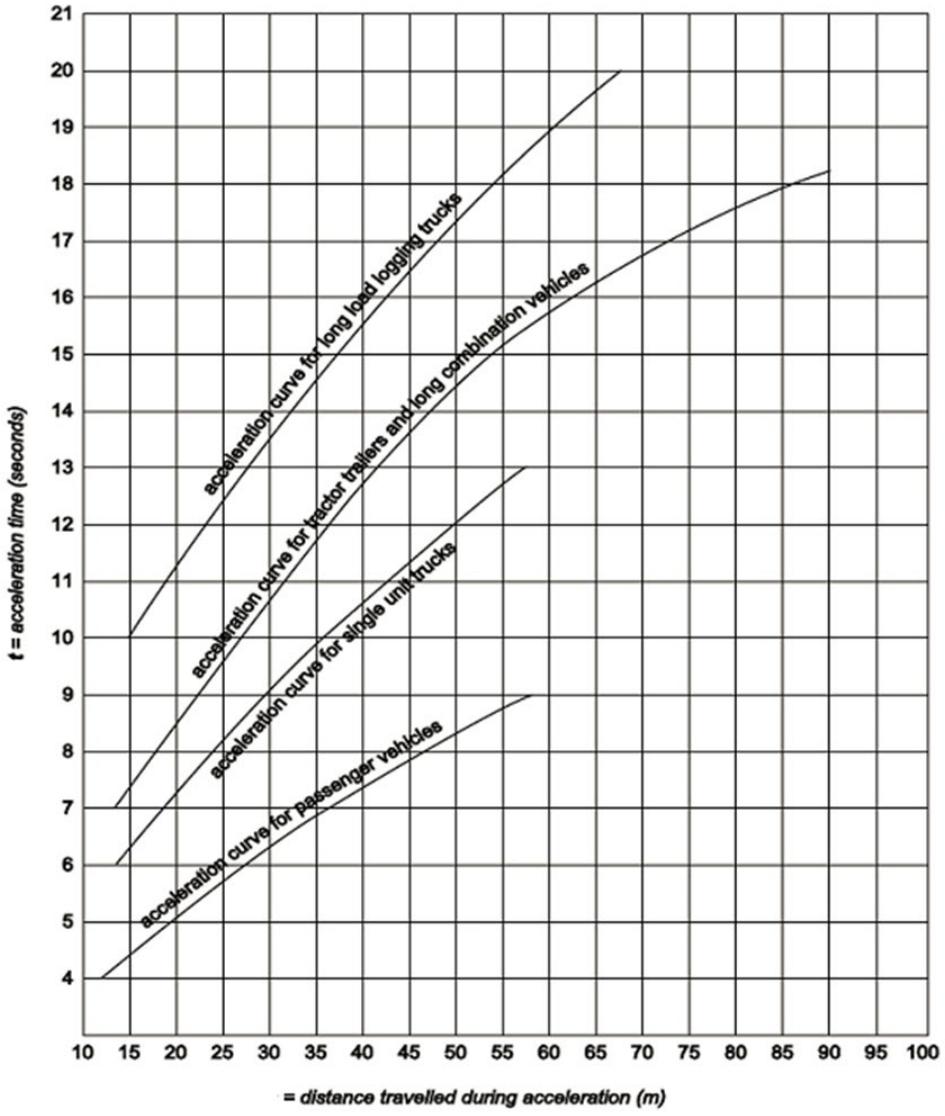


Figure 6.4 – Assumed Acceleration Curves

Section 7 - Warning Systems

If a warning system is installed or modified (relocated or replaced) at any crossing, the warning system must meet the full requirements of Transport Canada's most recent version of the Grade Crossing Standards.

Installation of a warning system at an existing crossing should be investigated and considered:

- Where the forecast cross-product is 2,000 or m.
- Where there is no sidewalk, path or trail and the railway design speed is more than 129 km/hr (80 mph).
- Where there is a sidewalk, path or trail and the railway design speed is more than 81 km/hr (50 mph).
- Where the railway design speed is more than 25 km/hr (15 mph) but less than the railway design speed referred to in b) or c), as the case may be:
    - Where there are two or more lines of railway where railway equipment may pass each other; or
    - The distance as shown in Figure 7.1 (a) between a Stop sign at an intersection and the nearest rail in the crossing surface is less than 30 m; or
    - In the case of an intersection with a traffic signal, the distance between the stop line of the intersection and the nearest rail in the crossing surface as shown in Figure 7.1 (b), is less than 60 m, or where there is no stop line, the distance between the travelled way and the nearest rail in the crossing surface is less than 60 m.

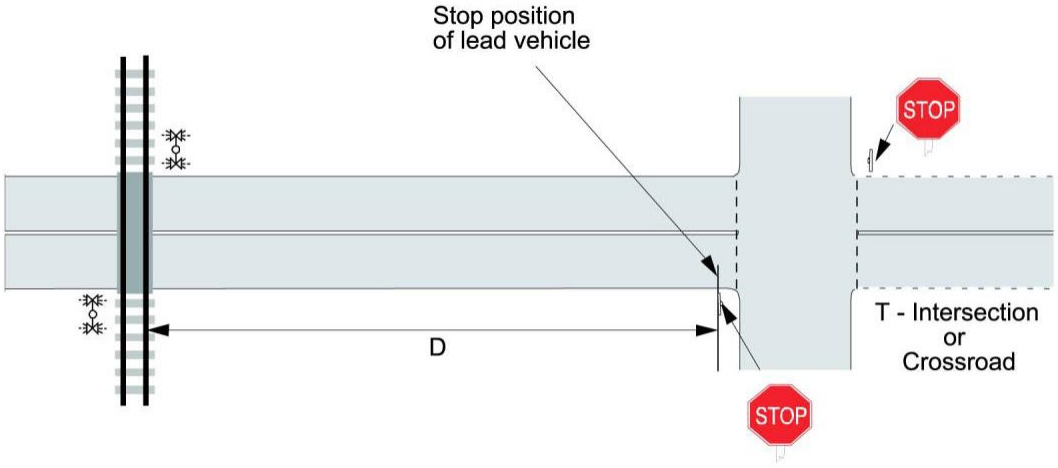


Figure 7.1(a) – Intersection with Stop Sign

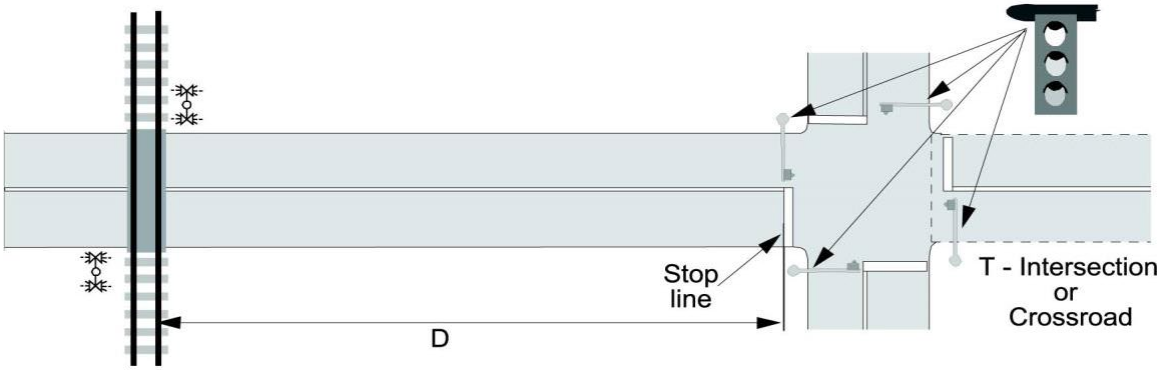


Figure 7.1(b) – Intersection with traffic lights

Subsection 7.1 - Warning Systems for Existing Grade Crossings

Existing medium and high priority crossings with warning systems must meet the following articles of Transport Canada's most recent version of the *Grade Crossing Standards*: within the general timeframes for compliance (November 28 2022, for high priority and November 28 2024, for medium priority):

- Article 13
- Articles 14.2 to 14.6
- Articles 16.1.1 (a) to (c)
- Article 16.2.2
- Article 16.3.1
- Article 16.4

Subsection 7.2 – Inspection, Testing and Maintenance

Inspection, testing and maintenance for Medium and High Priority crossings must be done in accordance with Section 92, 93, 94, 95, 96 and 109 of the federal Grade Crossing Regulations and Articles 17, 18, 19 and 20 of the federal Grade Crossing Standards. Inspection, testing and maintenance practices that meet these standards and requirements must be implemented as soon as practical and no later than November 28 2022, for High Priority crossings and no later than November 28 2024, for Medium priority crossings or any other date established by order of a provincial railway inspector.

Railways with warning systems on low priority crossings must develop an inspection, testing and maintenance plan for their warning system that will ensure reliable ongoing operations of the warning system.

Section 8 - Train Operations at Grade Crossings

Subsection 8.1 Railway Responsibility for Unnecessary Obstruction of Any Public Grade Crossing

It is prohibited for railway equipment:

- To be left standing in a manner that causes the activation of the warning system at a public grade crossing other than for the purpose of crossing that grade crossing.
- To be left standing on a crossing surface, or for switching operations to be conducted, in a manner that obstructs a public grade crossing - including by the activation of the gate of a warning system - for more than five minutes when vehicular or pedestrian traffic is waiting to cross it.

If an emergency vehicle requires passage across a grade crossing, the railway must take all necessary measures to immediately clear the grade crossing.

Subsection 8.2 Road Authority Responsibility for Crossing Operations

A road authority must take measures to:

- Ensure that motor vehicles do not stop on the crossing surface of a public grade crossing, if there is evidence that queued traffic regularly stops on that crossing surface.
- If the measures include interconnection with a warning system, the interconnection must meet the requirements established in articles 19.2 to 19.4 of the federal Grade Crossings Standards.

Subsection 8.3 Safety Concerns and Whistle Cessation

If railway equipment is operated in a manner that regularly causes the obstruction of any public grade crossing, including by the activation of a warning system, the railway company and the road authority must collaborate to resolve the safety concern identified by the municipality or road authority.

If a municipality or road authority provides notices to a railway about a safety concern related to crossing obstruction and are unable to resolve the safety concern, either party may apply for dispute resolution assistance from the Transportation Programs Unit at MoH.

If a municipality intends to implement a whistle cessation bylaw for crossings within their jurisdiction, the municipality shall conduct a railway crossing safety assessment in collaboration with the railway and submit a formal notice to the MoH. MoH will not permit or approve whistle cessation without written support from the railway and the road authorities responsible for the crossings in prescribed whistle cessation area. For further information about the whistle cessation approval process, the Transportation Programs Unit at MoH should be contacted.

Contacts

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