



GRADE SEPARATION ASSESSMENT GUIDELINES

These guidelines help railway companies and road authorities assess when to consider grade crossings for grade separation, or otherwise eliminate them, thereby removing a road/rail conflict zone.

About these guidelines

These guidelines respond to the 2015 Transportation Safety Board (TSB) [Recommendation R15-04](#), made after the fatal collision between an OC Transpo bus and a VIA Rail passenger train at an at-grade railway crossing in Ottawa, Ontario, on September 18, 2013. This recommendation specifies that “The Department of Transport provide specific guidance as to when grade separation should be considered.”

In February 2018, Transport Canada funded a literature review on grade separation approaches, done at the University of Manitoba. To obtain a copy of the final report of this study, "Review of Research and Practice on the Implementation of Grade Separation," please contact the Rail Safety Directorate at railsafety@tc.gc.ca

What to consider in assessing grade crossings for grade separation

Where possible, you should not assess a crossing in isolation. Rather, consider it in the context of the rail corridor in which it and adjacent crossings are located.

As well, these guidelines do not preclude further evaluation of a location. A site-specific study and feasibility analysis are essential to establish whether or not a grade separation is possible.

The table below lists:

- criteria with thresholds
- additional criteria with no established thresholds, which you may consider as part of a more detailed analysis
 - These criteria do not have thresholds because the range, or manner in which they are treated or quantified, may vary significantly from one location to another

Table 1.0: Criteria to consider in assessing grade crossings for grade separation

<i>Criteria</i>		<i>Value or threshold for grade separation candidates</i>
Criteria (with threshold)	<i>Traffic and Safety-related criteria</i>	
	Traffic volume	AADT* exceeds 100,000
	Train volume	Average of 150 or more trains per day*

	Vehicle speed	Posted/Unposted highway speed equals or exceeds 90 km/h.
	Cross product	Cross product exceeds 1 million*
	Queuing	Existing crossings where there are known queuing issues and an entranceway or intersection is within 30m of the nearest rail of the crossing. Note: New grade crossings are not permitted where the train speed is more than 25km/h, and there is an entranceway or intersection within 30m of the nearest rail of the proposed crossing.
	Maximum train speed	Train speed exceeds 177 km/h (110 mph).
	Vehicle delay	Exceeds 40 vehicle hours per day.
	Level of service	If the highway/roadway facility is performing at a level of service below its intended minimum design level 10 percent or more of the time.
<i>Other criteria for consideration in identifying locations for further assessment</i>		
Criteria (without threshold)	<ul style="list-style-type: none"> • Collision history or predicted collisions • Blocked crossing issues • Number of highway/roadway lanes • Number of railway tracks • Type of railway traffic (i.e. passenger, dangerous goods) • Highway functional classification • Road surface type • Environmental impacts • Air quality / emissions • Noise disruptions in community 	<ul style="list-style-type: none"> • Type of roadway traffic (pedestrians and cyclists, vulnerable road users, emergency services, school buses, dangerous goods) • Various adaptations of 'cross product' (i.e. consideration of the number of occupants such as passenger rail, bus or transit) • Development, community and social impacts (quality of life, community cohesion, aesthetics, business disruption) • Feasibility and constructability • Other (secondary) network impacts • General physical conditions • Land use

**For further information on measuring these values, please consult the Institute of Transportation Engineers (ITE), Transportation Association of Canada (TAC) and other relevant manuals or guidance material relevant within your jurisdiction.*

Note: It may be appropriate to consider a combination of criteria when assessing a crossing for grade separation.

Terms to know

Annual average daily traffic (AADT): The average daily vehicular traffic volume for a given year at a site.

Cross product: A product of the average number of trains per day multiplied by the AADT at a grade crossing.

Highway functional classification: The category of highway that defines the role it plays in serving traffic flow through a road network.

Level of service (LOS): A qualitative measure used to relate the quality of vehicular traffic service. Used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures like vehicle speed, density and congestion. Defined in terms of volume-capacity (V/C) to quantify the average operational condition of the grade crossing during the peak hour.

Queuing: The study of traffic behavior in a segment of a roadway, where demand exceeds available capacity. In the context of grade crossings, where nearby entrances or intersections are close to the crossing, vehicular traffic on the road approach may extend across a railway crossing or into the track area.

Vehicle delay: The time lost by a vehicle due to traffic-related causes beyond the control of the driver.

Vulnerable road users: According to the *Ontario Highway Traffic Act*, vulnerable road users include:

- pedestrians
- people on a bicycle or a motor-assisted bicycle
- people in a wheelchair or other mobility device
- roadway workers
- emergency responders outside their motor vehicle

They are vulnerable due to lack of protection they have from traffic.