

Speed limits in urban areas: A new approach

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Executive Summary

In spring 2015, the Ministère des Transports du Québec (MTQ) and the Table québécoise de la sécurité routière (Québec Road Safety Task Force, TQSR) published a new guide entitled *Guide de gestion de la vitesse sur le réseau routier municipal en milieu urbain* (Manual for managing speed on municipal road networks in urban areas). The purpose of the guide is to help municipalities make decisions regarding speed management on road networks in urban areas for which they are responsible.

Speed in urban areas is a major issue; recognized as one of the main factors contributing to road collisions and their severity, speed also affects quality of life and is regularly the subject of complaints from residents. The diagnosis can be complex and solutions fall within multiple spheres: speed limit regulation, road design, signage, road user awareness and police enforcement. In this context, a speed management strategy is essential.

The guide proposes an intervention approach and a new perspective in determining speed limits in urban areas. It is not only based on the characteristics of the road environment, but also takes into account the effects of speed on the risk of injury to pedestrians and other vulnerable road users. Overall planning based on the functional classification of the road network is also recommended.

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1. Setting speed limits on municipal road networks in Québec

In Québec, responsibility for the road network is shared between several managers. In the urbanized part of the province, this responsibility falls primarily to the Ministère des Transports (MTQ), in charge of highways and provincial network roads, and to municipalities, which manage the local network, including urban streets.

Municipalities are in particular in charge of speed management on road networks under their jurisdiction. They can change speed limits, redesign streets, install signage, conduct public awareness campaigns and plan speed control operations jointly with police.

The MTQ provides municipalities with technical documents to help them make the most appropriate decisions. Two documents on setting speed limits are available. The first is a brochure entitled *Aide à la détermination des limites de vitesse sur le réseau routier municipal*, published in 2008 by the Table québécoise de la sécurité routière (Québec Road Safety Task Force, TQSR) and the MTQ, and the second is the *Manual for setting speed limits on municipal road networks*, published by the MTQ in 2002.

In recent years, a number of municipalities have given consideration to this issue for their whole territory and have lowered the speed limit on local residential streets to 40 km/h and even to 30 km/h in some rare cases. Moreover, municipalities that change the speed limit in school zones tend to reduce it to 30 km/h.

However, recognized principles for setting speed limits are not always applied. Also, the ways in which speed limits are set are not always consistent from one municipality to the next, within the same town or within the same region, in that the same speed limit can be found on roadways with very different characteristics. These two issues explain why reducing speed limits can sometimes undermine the credibility of these lower limits, which are not consistent with the characteristics and surroundings of the streets. This is not conducive to road user compliance with speed limits.

These findings prompted the TQSR to take a closer look at speed in municipalities. A discussion forum created in 2005, the TQSR is mandated to make recommendations to the Québec Minister of Transport on improving the province's road safety record. In 2008, a task force was created to deal with the issue of speed in municipalities.

The TQSR produced three reports of recommendations. In the second report, published in November 2009, it recommended establishing an overall framework for managing speed limits in urban areas, revising technical documents for municipalities, and developing analysis and awareness tools to better manage concerns about speed in residential neighbourhoods.

The third report, published in October 2013, contained three recommendations on managing speed in urban areas:

- Recommendation 19: Encourage municipalities to structure their intervention approaches in terms of speed management in urban areas around seven major steps: opportunity for

intervention; road safety diagnosis; preparation and adoption of a speed management intervention plan in consultation with residents and users; implementation of intervention measures adopted; evaluation of the impact on speeds used; implementation of additional measures; periodic follow-up.

- Recommendation 20: Encourage municipalities that plan to revise the speed limits in their territory to set the speed limit at 40 or 30 km/hr only under conditions where this will be credible and respected by drivers.
- Recommendation 21: Encourage municipalities to set a speed limit of 30 km/h in school zones and playground zones on municipal local streets and collector streets where the limit is 40 or 50 km/hr outside of school zones or playground zones.

The TQSR also proposed that a guide for municipalities be published in order to provide more details on the intervention approach and actions to be implemented. Thus, a guide for managing speed on municipal road networks in urban areas entitled *Guide de gestion de la vitesse sur le réseau routier municipal en milieu urbain* was published in spring 2015 by the MTQ and TQSR.

2. Objectives of the *Guide de gestion de la vitesse sur le réseau routier municipal en milieu urbain*

The purpose of the guide is to help municipalities make decisions regarding speed management on road networks in urban areas for which they are responsible.

Speed in urban areas is a major issue; recognized as one of the main factors contributing to road collisions and their severity, speed also affects quality of life and is regularly the subject of complaints from residents. The diagnosis can be complex and solutions fall within multiple spheres: speed limit regulation, road design, signage, road user awareness and police enforcement. In this context, a speed management strategy is essential.

The guide is intended for elected officials, managers and technical staff in local and regional municipalities of any size, the MTQ, and organizations and consulting firms operating in the transportation and mobility industry.

Its objectives are to:

- describe the regulations and specify the enforcement rules;
- provide information on the technical aspects of speed in urban areas;
- propose an approach to managing speed in urban areas;
- facilitate discussions on setting speed limits on municipal road networks; and
- foster consistent practices in various Québec municipalities, while taking account of the characteristics specific to each area.

The guide can be applied to municipal streets or roads serving mainly built-up areas and located in a village, in the entire urbanized area of a city or, more broadly, within an urbanization perimeter. In particular, this includes streets in different categories (arterial roads, municipal collector road, local streets) that have residential, commercial, institutional, recreational and industrial uses, as well as the portion of rural roads running through a village or a built-up area (roads through urban areas). These roadways can be located in large urban centres, in cities of varying size or in small municipalities.

The guide discusses fixed and variable speed limits on municipal road networks, but cannot be used for temporary speed limits in roadwork zones.

3. Speed in urban areas: a multitude of issues

The first chapter of the guide covers the many issues associated with speed. Being able to drive at higher speeds, when traffic flows permit, may mean shorter travel times, especially on a route with intersections that are quite far apart and that are managed so as to minimize stops and slowdowns; these conditions are conducive to the mobility of people and goods. However, high motor vehicle speeds are also detrimental to road safety, quality of life and the environment.

Speed is recognized as one of the main causes of road accidents. Many studies¹ argue that the risk of collision and the severity of the resulting injuries increase with higher speeds. Motor vehicle speed and the presence and overall quality of pedestrian and cycling infrastructure also have an effect on walking and cycling.² However, road users do not always follow speed limits on road networks in urban areas.

Many factors come into play when a driver chooses the speed at which to drive, the main being road design and the immediate surroundings.³ Speed limit signs themselves have very little influence over driver behaviour. Surveys conducted before and after a speed limit change in an urban area measured this aspect. What they found was that if no other measure, be it police enforcement operations or a different road design, is added to the change in the posted speed limit, the speed at which people drive does not change significantly.⁴ Generally speaking, wide and long roads and sight clearances with little access as well as few intersections and parked vehicles on the road incite drivers to drive faster.

4. For an intervention approach to managing speed in urban areas

Given the complexity of speed-related issues, it is not always easy to identify the most effective solution. In this context, a structured, comprehensive approach is often required so that municipalities can make decisions best suited to the situation.

The proposed strategy stems from recommendations that the TQSR presented in its third report of recommendations in 2013. The TQSR drew inspiration from the most innovative strategies in the field, such as Sweden's Vision Zero initiative and the Dutch Sustainable Safety vision, based on the Safe System⁵ approach. The TQSR also took into account Québec's experience with setting speed limits and leaned on relevant research.⁶

¹ Federal Highway Administration (FHWA), *Crash modification factors Clearinghouse*.

[<http://www.cmfclearinghouse.org>] (consulted in November 2014)

M.C. TAYLOR, D. A. LYNAM et A. BARUYA. 2000. *The effects of drivers' speed on the frequency of road accidents*, Transport Research Laboratory Report 421, UK.

Organisation for economic co-operation and development (OECD) and European Conference of Ministers of transport. 2007. *Speed management*, 283 p.

² K. J. KRIZEK *et al.* 2009. *Walking and Cycling International Literature Review*, Final Report, Victoria Department of Transport, 102 p.

³ L. BELLALITE. 2011. *Étude des conditions optimales correspondant aux différentes limites de vitesse en milieu urbain, rapport final*, Laboratoire d'application et de recherche en aménagement, Université de Sherbrooke, 78 p.

⁴ L. BELLALITE, *op. cit.*

⁵ OECD. 2009. *Towards Zero. Ambitious Road Safety targets and the Safe System approach*.

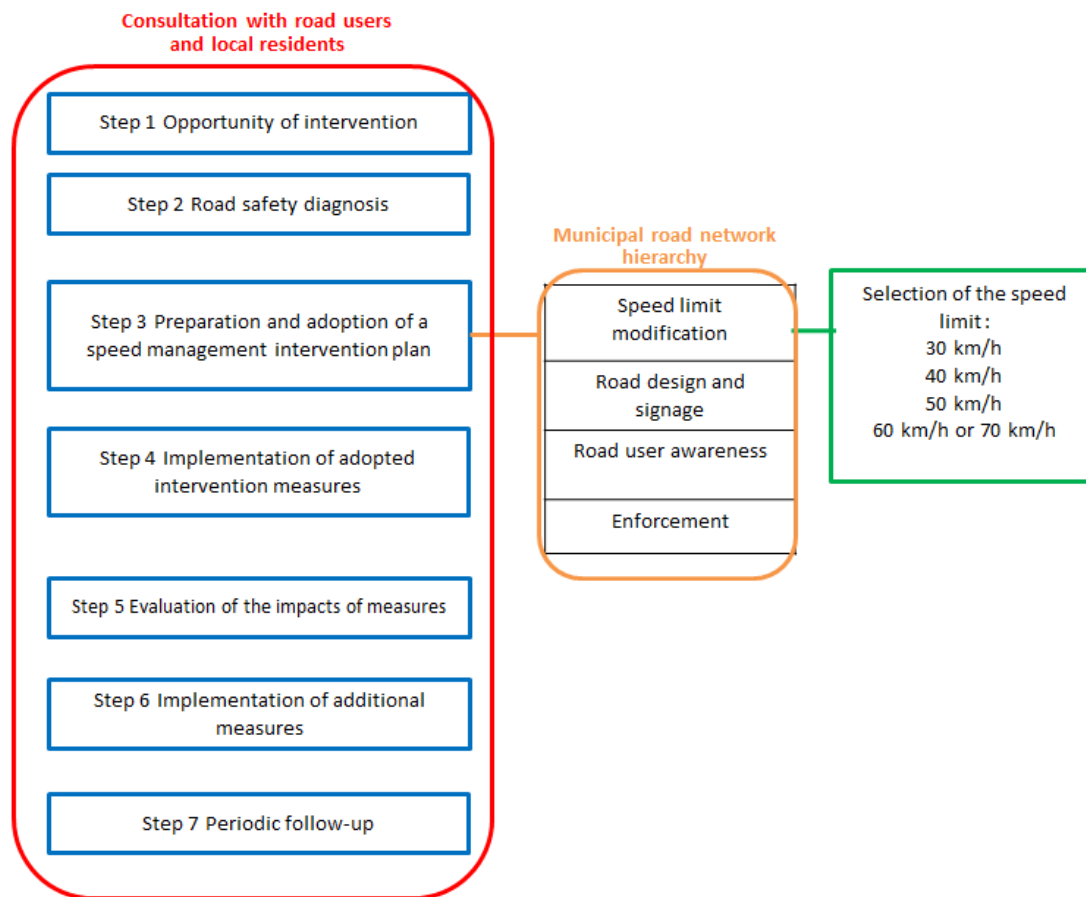
⁶ L. BELLALITE, *op. cit.*

The adoption by a municipality of a coordinated and structured approach to speed in urban areas contributes to the achievement of the following objectives:

- Encourage driving at safe speeds;
- Promote active, public and alternative methods of transportation, improve their safety and enhance the feeling of safety, particularly among individuals with disabilities and reduced mobility;
- Maintain the function of motor vehicle traffic mobility on arterials and collector roads; and
- Ensure better sharing of space and road.

The approach is summarized in Figure 1. It can be applied to a street or a section of street, to some or all streets in a neighbourhood, or to the road network across an entire municipality.

Figure 1. Approach to managing speed in urban areas



Consultation with road users and local residents is critical in order to correctly identify the needs and issues, and to find the most suitable solutions. Their involvement in the project is a key success factor. Municipalities can hold consultations at stages they deem appropriate, bearing in mind the project size and their resources.

The guide describes each step in the approach in greater detail. One chapter is dedicated to setting speed limits in urban areas, whereas other parts of the document provide references to technical documents and financial assistance programs in relation to street design, signage, road user awareness and police enforcement measures.

5. Setting speed limits on municipal streets in urban areas

Speed limits are an important component of a speed management strategy. The guide points out the need to set appropriate speed limits. It also outlines the basic principles to be applied when choosing a speed limit as well as the method for setting limits that are in line with these basic principles.

5.1 Safe System approach to speed management

The methods for setting speed limits currently available for Québec municipalities are based on a series of criteria related to the road environment and to the environment being driven through. Tables, once filled in with the required data, provide a recommendation on the speed limit to be set. The documents published by the Transportation Association of Canada⁷ are based on a similar method.

The method proposed in the new guide is not only based on road environment characteristics, but also draws on the Safe System approach by taking into account the effects of speed on the risk of injury to pedestrians and other vulnerable road users.

The Safe System approach, adopted by an increasing number of countries around the world and recommended in the most recent literature on road safety improvement strategies, proposes a new way of addressing the risk of accidents on the roads. Its basic observation is that road deaths and injuries are unacceptable and can be avoided. The long-term objective is to eliminate deaths and serious injuries as a result of road accidents.

Speed management is at the core of the Safe System approach. The idea is that, in the event of a collision, the force of the impact should be below the threshold likely to cause death or serious injury. This threshold varies depending on the type of accident and the degree of user protection.

Pedestrians and other vulnerable road users have little chance of surviving a collision with a vehicle travelling at more than 30 km/h. The occupant of a vehicle, meanwhile, will have little chance of surviving or avoiding serious injury following a side impact if the speed is above 50 km/h, and of surviving or avoiding serious injury following a head-on collision if the speed is above 70 km/h.

These findings have prompted certain countries to define new speed limit targets, in other words, speed limits should not exceed 30 km/h on roadways where vehicles and pedestrians share the road, 50 km/h on streets in urban areas with frequent intersections and where side impacts may occur, and 70 km/h when head-on collisions may occur.

⁷ Transportation Association of Canada. 2006. *School and Playground Areas and Zones: Guidelines for Application and Implementation*, 34 p.

Transportation Association of Canada. 2009. *Canadian Guidelines for Establishing Posted Speed Limits*, 68 p.

5.2 Setting speed limits, a new approach

A few basic principles need to be observed when setting speed limits:

- Credibility of signage
- Harmonization of expected driver behaviour
- Standardization of speed limits
- Consideration of vulnerable road users and roadside activities
- Effectiveness of police enforcement
- Importance of driver education
- Suggested minimum lengths of speed limit zones

Based on these principles, the speed limits presented in the table below can be applied to roads in urban areas under certain conditions, which are detailed in the guide.

Table 1. Speed limits in urban areas

Speed Limit	Street Type
30 km/h	School and playground zones on local municipal streets or collector streets
	Tertiary local residential streets
40 km/h	Local residential streets, municipal collector streets where residential or commercial activity is dense
50 km/h	Arteries, municipal collector streets, local streets
	Some school and playground zones
70 km/h (60 km/h)	Arteries, municipal collector streets of four lanes or more Freeway collectors

The conditions have to do mainly with roadway characteristics and are intended to ensure that the speed limit is credible and respected by drivers; this principle also underlies the methods presented in previously published guides. The new guide also calls for comprehensive planning as part of which speed limits are set in accordance with the functional classification of the road network.

Thus, when setting a speed limit, consideration should be given to at least the entire neighbourhood in which the street under study is located and, preferably, the entire municipality or built-up area. The goal is to set similar speed limits on streets with similar characteristics, part of the same functional class and passing through the same type of environment.

The new approach also takes into account the effects of speed on the risk of injury for pedestrians and other vulnerable road users, as in the Safe System approach. In Québec's case, the speed limit hierarchy proposed in Table 1 may be considered as a realistic step towards the long-term implementation of Safe System principles.

A different speed hierarchy can also be used. However, given the street characteristics in most Québec municipalities, lower speed limits will generally require higher investments in other measures, particularly road design, so that the speed limit is consistent with the road environment. This implementation can be done in stages if the necessary additional measures require excessively high investments.

School zones and playground zones

Given the particular vulnerability of children who walk or bike, associated with their age (physical size, cognitive development), it is important to encourage reduced speeds in school zones and playground zones and, consequently, opt for as low a speed limit as possible, taking into account street characteristics and the surroundings.

In school zones and playground zones located on local streets and municipal collector streets with speed limits of 40 or 50 km/h, it is therefore recommended that a speed limit of 30 km/h be set, either at all times when this is consistent with the physical surroundings or during periods of activity only when the physical surroundings are compatible with a speed limit of 40 or 50 km/h.

On arteries with a speed limit of 50 km/h outside school zones or playground zones, a comprehensive road safety study needs to be conducted. Given the geometric characteristics of arteries and their primary function in terms of motor vehicle traffic, a speed limit of 50 km/h is typically the most appropriate in school or playground zones. A speed limit of 30 km/h could be considered during periods of activity, if warranted by the comprehensive road safety study and if the necessary measures, particularly road design, are put in place so that the limit is credible and followed.

On streets with speed limits above 50 km/h outside school zones, the speed limit in school zones must be 50 km/h during at least the period provided for under the *Highway Safety Code*, that is, from Monday to Friday and from September to June between 7 a.m. and 5 p.m. The speed limit should not be reduced to less than 50 km/h.

On streets with speed limits above 50 km/h outside playground zones, the speed limit in playground zones should be 50 km/h during the period of activity. The municipality can choose the most suitable period for the zone being considered.

Speed limit of 30 km/h

A reduction in speed limit to 30 km/h may be considered, particularly to substantially reduce driving speeds and, consequently, the risk of injury to pedestrians and cyclists as well as the severity of resulting injuries.

In a context of speed limit harmonization and hierarchy across a municipality or built-up area, a 30 km/h limit may be set on tertiary local streets, in other words, local residential streets where the average annual daily traffic is less than 500 vehicles per day.

If no other measure is planned, such as road design, public awareness or police enforcement, a speed limit of 30 km/h should only be set on existing streets that have certain characteristics in order to be credible and respected by drivers. These characteristics are:

- the usable width, namely the width of traffic lanes, excluding parking or shoulders, is less than 6 m;

- street parking is permitted on one side, or even both sides, and vehicles are very often parked in those spaces;
- the maximum distance that a driver may need to travel before reaching a street with a speed limit of 40 or 50 km/h is less than 1 km.

If these conditions are not met, or if the driving speeds measured during the diagnosis are too high, it is likely that a reduction in speed limit will not change driver behaviour. The municipality will then need to consider implementing additional measures, such as traffic calming techniques, road user awareness or police enforcement.

Very low driving speeds foster better road sharing between all road users, motor vehicle drivers, pedestrians, people who use motorized mobility aids and cyclists.

Speed limit of 40 km/h

A reduction in speed limit to 40 km/h may be considered, particularly to reduce driving speeds and, consequently, the risk of injury to pedestrians and cyclists as well as the severity of resulting injuries.

In a context of speed limit harmonization and hierarchy across a municipality or built-up area, a 40 km/h speed limit may be set on local residential streets or on municipal collector streets where commercial or residential activity is dense.

If no other measure is planned, such as road design, public awareness or police enforcement, a speed limit of 40 km/h should only be set on existing streets that have certain characteristics in order to be credible and respected by drivers. These characteristics are:

- there is a maximum of one lane in each direction;
- the width between curbs ranges from about 8 m to 10 m (for example, two traffic lanes and street parking on one side, or a one-way with street parking on both sides).

If these conditions are not met, or if the driving speeds measured during the diagnosis are too high, it is likely that a reduction in speed limit will not change driver behaviour. The municipality will then need to consider implementing additional measures, such as traffic calming techniques, road user awareness or police enforcement.

When vehicles travel at a speed of about 40 km/h, road sharing between road users can take different forms. There should be sidewalks on both sides along school zones, school routes, playground zones and areas where retirement homes and hospitals are located. They are also generally required along municipal collector streets where commercial or residential activity is dense. Cyclists typically ride on the roadway; the street may also be recognized as a designated shared roadway, with signage for that purpose.

Speed limit of 50 km/h

The *Highway Safety Code* provides for a speed limit of 50 km/h in built-up areas, except on autoroutes. Generally speaking, this limit may therefore be considered appropriate for streets located in urban areas.

However, it may be questioned when it is one of the factors behind road safety issues or when the municipality wants to promote active transportation. Performing a diagnosis will identify the measures to be implemented, including potentially changing the speed limit.

Thus, as part of the harmonization of speed limits across an entire municipality or built-up area, a limit of 50 km/h will be posted on streets with higher traffic volumes and where motor vehicle traffic predominates relative to local life. These streets are typically arterial or collector roads; this is also the case for a rural municipal street running through an urban environment (roads through urban areas).

Since the risk of conflicts and the severity of injuries are greater on this type of street than on local residential streets, it is important that road safety issues be well known and that priority be given to allocating resources necessary to resolve them, if need be. Road design should foster compliance with the speed limit and safe conditions for all road users, including pedestrians and cyclists.

Speed limits of 70 km/h and 60 km/h

A speed limit of 70 km/h may be considered when all of the following conditions are met:

- the roads are either arterial roads / municipal collector roads with four lanes or more that are or are not divided, or freeway collectors, in other words, unidirectional roadways with limited access, adjacent to freeways. A limit of 70 km/h may be considered for a freeway collector when the speed limit on the freeway is 100 km/h;
- motor vehicle traffic predominates and includes through traffic, public transit vehicles and heavy vehicles. There is little local life, which typically means that there are few pedestrians and little urban activity;
- intersections and direct accesses are infrequent. This is the case at rural-urban transition zones, for example.

A limit of 50 or 70 km/h is more advisable than a limit of 60 km/h. A speed limit of 60 km/h should be reserved for particular situations. It may be set under conditions similar to those applicable to a 70 km/h limit, but in a less uniform manner (an inconsistent or asymmetrical built environment, a mix of commercial, residential and industrial uses, etc.).

Since the risk of conflicts is greater on this type of street than on local streets, it is important that a diagnosis be performed, that road safety issues be well known and that priority be given to allocating resources necessary to resolve them, if need be. Road design should foster compliance with the speed limit and safe conditions for all road users.

On a street where vehicles travel at 70 km/h, particular caution should be exercised in the presence of pedestrian and cyclist traffic, even if it is quite light. Higher vehicle speeds require separation between motor vehicles and vulnerable road users as well as proper treatment of intersections.

6 Conclusion

In light of the many issues associated with speed in urban areas, municipalities are often called upon to address requests and make decisions in that regard. They may take action in many areas in order to manage speed: speed limit regulation, road design, signage, road user awareness and police enforcement.

This guide proposes a structured approach that incorporates these various areas of action. In particular, it focuses on setting speed limits and discusses the types of streets on which a speed limit may be set as well as the conditions for setting them. As for other areas of action for managing speed, references are presented in different parts of the document.

A guide for managing speed in rural areas entitled *Guide de la gestion de la vitesse en milieu rural*, currently being prepared, will complement the urban guide and will update the technical documents distributed to municipalities.

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