Traffic Lane Width of 3.0 m in Urban Environments

March 2014

Briefing Note

For up-to-date knowledge relating to healthy public policy

This document is part of a series of briefing notes documenting innovative municipal norms that have the potential to help create environments promoting safe active transportation by changing the design or organization of public roadway networks.

In this document, we will discuss reducing the default traffic lane width to 3.0 m in urban environments. The main objectives of this norm are to reduce motorized traffic speeds and to enable public space to be reallocated for other uses and other users—specifically in order to make active transportation safer and more pleasant. We will also examine the potential drawbacks and challenges related to implementing this norm.

Model formulation for this norm

The default width of traffic lanes in the municipality of X shall be 3.0 m (10 ft).

Alternate formulation

In the municipality of X, the default width of traffic lanes within the municipal street network with a limited volume of truck and bus traffic shall be 3.0 m (10 ft).

Normative context

In order to determine traffic lane width, municipalities and their engineers refer to geometric design guides for roads, which typically suggest a range by proposing minimum and maximum lane widths for different types of roadways. That said, the standard practice in North America, and more specifically in Canada, is to use the maximum widths recommended by the relevant reference guides. That is especially the case for arterial and municipal collector streets, where posted speed limits are generally 60 km/h and under. These lane widths typically vary from 3.5 m to 3.7 m (or wider), and are similar to the widths recommended by U.S and Canadian design guides for highways and expressways (3.6 m to 3.7 m [approximately 12 ft]).[1] Adopting a municipal norm that would establish the default traffic lane width at 3.0 m would reduce the width of traffic lanes on local, collector and arterial streets in urban environments (cities, suburbs and village centres), which are not designed to handle significant volumes of motorized traffic driving at high speeds.

Anticipated benefits

Reducing the default traffic lane width to 3.0 m would generally enable more optimal space-sharing between motorized vehicle traffic and other street users (pedestrians, cyclists, etc.). It would also provide a greater balance between the mobility-related functions of municipal streets and the other functions of these streets and the areas bordering on them. This goal would essentially be achieved by (1) reducing traffic speeds to levels close to the posted speed limits[2] and (2) reallocating public space for other purposes and other users.

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1 For example, the Transportation Association of Canada's *Geometric Design Guide for Canadian Roads* (TAC, 2007), recommends a traffic lane width of 3.7 m (12 ft) specifically for highways and expressways, whereas the American Association of State Highway and Transportation Officials (AASHTO), in its guide entitled *A Policy on Geometric Design of Highways and Streets* (the "Green Book"), recommends a lane width of 3.6 m (12 ft) (AASHTO, 2011).

2 The speeds at which people drive are often higher than the posted speed limits, particularly because traditional practice consists of building (or optimizing) streets so they can be driven along relatively safely at higher speeds than the posted limit (frequently by 10 to 15 km/h over). The suggested reasoning is that there will always be drivers who drive faster than the posted speed limit, and that these drivers will still be safe despite exceeding the speed limit (TAC, 2007, s. 1.2.3.3 and 1.2.3.5; Ewing & Dumbaugh, 2009). However, since drivers tend to adjust their speeds according to their perception of danger, this practice often results in more drivers exceeding the posted speed limit and streets becoming more dangerous, particularly for pedestrians and cyclists, since traffic is moving faster (Ewing & Dumbaugh, 2009; Speck, 2012).

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EFFECTS OF SPEED REDUCTION

Reducing motorized traffic speeds in urban environments has an impact on health and its determinants, specifically because it:

- Reduces the risk of collision and serious collision, particularly with cyclists and pedestrians (Rosén & Sander, 2009; Taylor, Lynam & Baruya, 2000; Pucher, Dill & Handy, 2010);
- Promotes methods of active transportation by improving pedestrians' and cyclists' sense of security (Jacobsen, Racioppi & Rutter, 2009); and
- Reduces noise from motorized traffic, which contributes to making a street more pleasant for other users of public space (pedestrians, cyclists) and improves the health and quality of life of residents, children in parks and school yards and patrons of café and restaurant patios, etc. (Jacobsen et al., 2009).

Studies of effects on speed

It is generally accepted that reducing the width of streets or traffic lanes allows for a reduction in motorized traffic speeds (Institute of Transportation Engineers [ITE], 2010). One study has even found a linear relationship between lane width and the speed at which 85% of vehicle traffic is driven on suburban arterial streets (Fitzpatrick, Carlson, Brewer & Wooldridge, 2001). According to this study, a 0.5 m reduction in lane width, i.e., from 3.5 m to 3.0 m, should result in an average reduction in speed of 7.5 km/h.

In spite of this consensus and the results of this study, it should be noted that few assessments of 3.0 m lane widths on motorized traffic speeds have been conducted (Parsons Transportation Group, 2003; Sinclair Knight Merz Pty Ltd., 2011).

EFFECTS OF SPACE REALLOCATION

The reallocation of reclaimed public space could make it possible to:

- Develop safe pedestrian and cycling infrastructures that promote active transportation (Bureau of Transportation Statistics, 2004; Jensen, Rosendilde & Jensen, 2007; Lusk, Furth, Morency, Miranda-Moreno & Willet, 2011);
- Plant trees in order to contribute to reducing motorized traffic speeds (Macdonald, Sanders & Supawanich, 2008), combat urban heat islands and make streets more pleasant for users (Jacobsen et al., 2009; Loughner et al., 2012);
- Build raised medians to reduce the risk of frontal collisions between vehicles and make crossing the street easier and safer for pedestrians by providing a pedestrian refuge (Federal Highway Administration, n.d.); and
- Widen sidewalks and install benches to encourage socialization and walking (Speck, 2012).

On a typical arterial or collector street with four 3.7 m lanes, for instance, reducing the lane width from 3.7 m to 3.0 m would free up 2.8 m, providing ample space to add or widen a one-way cycle track or lane, or to add or widen a sidewalk.

Studies of effects of space reallocation

It is not possible to describe the general impacts of redesigning the street network, since the impacts would likely be connected to the specific modifications made. The addition of a cycle lane would evidently not have the same impact as the addition of a cycle track, pedestrian refuge island, parking lane, reserved bus lane or additional traffic lane.

Figure 1 uses three cross-sections to illustrate different possibilities resulting from a reduction in lane width to 3.0 m along a hypothetical street with four traffic lanes, two parking lanes and two sidewalks.

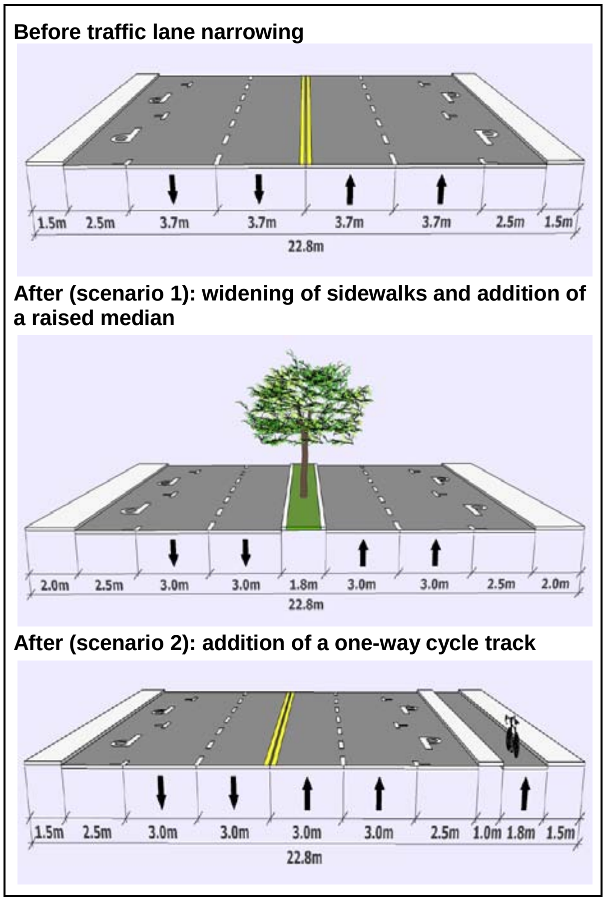

Figure 1 Illustration of some possibilities created by reducing traffic lane width

Figure developed by Olivier Bellefleur.

Potential disadvantages

There are three main potential drawbacks to reducing lane width to 3.0 m. Doing so may: (1) lead to congestion; (2) increase the number of collisions; (3) make cyclists feel unsafe.

IMPACTS ON CONGESTION

One of the assumptions guiding traditional road engineering practice is that wider traffic lanes provide greater traffic capacity than narrower lanes (ITE, 2010; Transportation Research Board [TRB], 2000). According to this assumption, a reduction in lane width would risk creating congestion along arteries where traffic volumes are nearing maximum capacity. This undesirable impact does not appear to apply to urban environments, however. In fact, the latest edition of the *Highway Capacity Manual*, the guide used to model highway capacity in the United States, the most recent conclusive data suggests that lane widths from 3.0 m to 3.9 m (10 ft to 12.9 ft) have no impact on the capacity of streets where traffic flow is interrupted by intersections (TRB, 2010), as is the case for streets in an urban environment. Reducing lane width to 3.0 m in urban environments should therefore not lead to congestion.

IMPACTS ON SAFETY

Another of the assumptions guiding traditional highway engineering practices is that wider traffic lanes are safer[3] because they provide a greater margin for error and therefore help to prevent collisions (and the ensuing injuries) in the event of minor deviations from course (Speck, 2012; Ewing & Dumbaugh, 2009). Reducing lane width would therefore tend to increase the number of collisions. However, the two most recent reviews of studies currently available on the subject instead report a drop in collision risk or no changes to this risk in the majority of cases where lane widths of 3.6 m to 3.7 m have been narrowed to 3.4 m or even 3.0 m on streets with a posted speed limit under 60 km/h (Potts, Harwood & Richard, 2007; Sinclair Knight Merz Pty Ltd, 2011). Contrary to traditional thinking, which is primarily founded on studies looking at rural roads, narrowing traffic lanes to 3.0 m in urban environments, where speeds are relatively low (under 60 km/h), should not increase the number of collisions; in fact, doing so may even reduce collisions.

IMPACTS ON CYCLISTS

Cyclists may not feel as safe in 3.0-m wide lanes as they do in wider lanes, since they are likely to be riding closer to moving vehicles (Gibbard et al., 2004; Schramm & Rakotonirainy, 2010). The addition of cycle tracks or lanes on streets with speed limits of 40 km/h and higher, or the conversion of local residential streets to “30 zones” when narrowing traffic lanes may not only offset this impact, but also improve cyclists’ sense of safety compared to the initial situation (Furth, 2012; Pucher & Buehler, 2008).

[3] Up to a certain width, approximately 4.0 m, where some drivers behave as if there were two lanes and not one.

Context of application

According to the geometric design guide for roads in the United States, this norm is appropriate for streets in an urban environment (cities, suburbs, village centres) where the posted speed limit is 60 km/h or under, namely on local residential streets and arterial and collector streets (AASHTO, 2011, pp. 7-29). The guide issued by Ministère des Transports du Québec (MTQ-Québec's ministry of transport) restricts this application to local[4] and collector[5] streets in urban environments (MTQ, 2013, chapter 1, p. 10).

Generally, municipal governments that have adopted this norm have approved exceptions enabling wider lanes (3.3 m and wider) to be maintained or built, particularly where a significant volume of truck and bus traffic exists or is expected. This practice often leads to one lane in each direction of a four-lane street—typically the outside lane—to be maintained in order to facilitate bus and truck traffic when volumes are significant enough. In the absence of a lane reserved for parking between the sidewalk and traffic lanes, a wider lane (e.g., by 0.5 m in Quebec) also helps to prevent vehicles driving over roadside drains[6] and makes walking more pleasant for pedestrians, (especially where there is no parkway next to the sidewalk or the sidewalk is narrow) (MTQ, 2013).

Some municipalities incorporate this norm in their guides for geometric street design so that all of their streets that meet the selection criteria end up complying with the norm when ongoing repair operations are carried out. Other cities like San Francisco have incorporated this norm through specific action plans such as road diets, which not only reduce the number of traffic lanes but often also involve lane width reductions (Sallaberry, 2012, 1:14:30).

Precedents

In Canada, the lanes of many residential streets in neighbourhoods built before 1920 still more or less correspond to this norm today. Recently, the city of Edmonton adopted a norm as part of its *Complete Streets* policy, and this is probably the closest policy in Canada to the norm proposed herein. The norm in Edmonton calls for a default lane width of 3.2 m for streets with two or more lanes where the right-of-way is not deemed to be "constrained," with the exception of busy truck routes (3.5 m). Where the right-of-way is deemed to be "constrained," the default width is 3.0 m, with the exception of streets carrying heavy bus (3.2 m) and truck traffic (3.4 m) (City of Edmonton, 2013, p. 33). Other cities like Ottawa and Vancouver also permit the use of lanes 3.0 m in width where available space is deemed to be "constrained" (Anderson, 2009; DELCAN Corporation – The Planning Partnership, 2008, p. 56).

In the United States, the city of Chicago, Illinois, adopted its own Complete Streets guidelines in 2013, according to which, "the standard width for automobile travel lanes, including turning lanes, shall be 10 feet" (Chicago Department of Transportation, 2013, p. 119). The guidelines also allow for one lane per direction to have a width of 3.3 m (11 ft) on busy bus or truck routes. Lanes wider than 3.3 m require the approval of a deviation from the norm. The Complete Streets design guidelines for the city of Boston, Massachusetts also recommend lane widths of 3.0 m where right-of-way is "constrained "—defined as where "trade-offs are required to meet the needs of all users" (City of Boston, 2013, p. 102). The guidelines also allow for wider lanes where heavy vehicles represent more than 8% of traffic volume. Similarly, the Complete Streets guidelines for Philadelphia, Pennsylvania recommend reducing lane width to 3.0 m where needed to accommodate other street users (Streets Philadelphia, 2012, p. 118). As a final example, the city of Olympia, Washington has also adopted the 3.0 m norm for all traffic lanes on arterial and collector streets, leaving city engineers the freedom to recommend wider lanes on high-frequency bus and truck routes on the strength of a safety assessment (City of Olympia, 2013, p. 10).

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4 Local streets are defined as roadways with a speed limit between 30 km/h and 50 km/h with traffic volumes of under 3,000 vehicles per day (MTQ, 2013, chapter 5, standardized drawing 013).

5 Collector streets are defined as roadways with a speed limit between 50 km/h and 70 km/h with traffic volumes of over 1,000 vehicles per day (MTQ, 2013, chapter 5, standardized drawing 013).

6 Over time, driving over drains tends to create significant gradients in the road surface, which can lead to hazardous manoeuvres by drivers and cyclists as they steer in avoidance (Audet, 2014).

Facilitators

In many urban environments, there is strong pressure from multiple sources to reallocate street space. Among other things, there are demands to increase and improve cycling and pedestrian infrastructure, to create busy and vibrant commercial streets and to plant more trees. These pressures from residents, cycling groups, parents and business owners are creating a political window to reduce lane widths and redevelop street space.

Narrowing traffic lanes may also be a beneficial move from a financial perspective. In terms of building new streets in new neighbourhoods, narrowing traffic lanes makes it possible to maximize density and reduce construction and maintenance costs while also maximizing tax revenues (ITE, 2010). With regard to the redevelopment of existing roadways, the narrowing itself usually only requires new lane markings. Moreover, this can easily be integrated with regular road marking maintenance operations. The total cost of specific redevelopment initiatives will, however, depend on how the space is redeveloped and how these operations are integrated into municipalities' scheduled maintenance work. By way of example, the cost of a new concrete sidewalk is more significant than a new cycle lane created by new road markings.

Many Canadian provinces have grant programs that offer funding for redeveloping municipal roadways, be it indirectly through grants for water main or sewer network maintenance, or directly through grants for developing infrastructure to promote active or collective transportation. The work carried out under these grant programs can be an attractive way to study the possibilities offered by a redevelopment that includes 3.0-m wide traffic lanes.[7]

Obstacles

In Canada, the *1995 Urban Supplement,* now an integral part of the *Geometric Design Guide for Canadian Roads,*[8] recommends lane widths of 3.0 m to 3.7 m for residential streets and widths of 3.3 m to 3.7 m for collector and secondary arterial streets (speed limit 60 km/h and under). This federal guide and the provincial guides ensuing therefrom do not have regulatory status restricting municipalities and their engineers. The fact that these guides recommend a minimum width of 3.3 m (frequently 3.5 m and wider in provincial guides) for the majority of streets may partially explain the preference of Canadian engineers for wider traffic lanes, even in urban areas. In fact, one might assume that compliance with the minimum recommended value may help to protect an engineer against the risk of legal action in the event of a collision (Los Angeles County, 2011, pp. 1-5).

It should be noted, however, that the guides for road design in some provinces are more favourable than others to the implementation of 3.0 m wide traffic lanes in municipal street networks. As it was previously mentioned, the Quebec guide, for instance, recommends 3.0-m wide lanes on local streets and collector streets in urban environments (MTQ, 2013, chapter 1, p. 10).

We should also remember that the American Association of State Highway and Transportation Officials (AASHTO) guide, *A Policy on Geometric Design of Highways and Streets* (the "Green Book"), also referred to by Canadian engineers, is more flexible. In fact, it recommends lane widths of between 2.7 m and 3.6 m on local streets and between 3.0 m and 3.6 m on collector and arterial streets in urban environments (AASHTO, 2011). The *Urban Street Design Guide*, developed by the U.S. National Association of City Transportation Officials (NACTO) to help municipalities to create streets and public spaces that are pleasant, safe and conducive to active transportation, also recommends a default lane width of 3.0 m in urban environments (NACTO, 2013). Several cities and one state in the U.S. have adopted this guide.[9] Some cities in Canada may also decide to adopt it.

Emergency services, and particularly fire services which use (increasingly) longer and wider vehicles with little or no articulation, may also be against the narrowing of certain traffic lanes if they perceive that the change would slow down or complicate their access to certain streets by making corners more difficult to turn. When contemplating measures that can affect emergency response times, an approach is to involve emergency services in the consultation process to define an emergency route network right

7 Considering the wide variety and number of grant programs available, the eligibility of projects of this nature should obviously be checked with the relevant authorities.

8 Currently under review.

9 See: http://nacto.org/urban-street-design-guide-endorsement-campaign/

from the planning stage. In this case, this would be when the decision is made as to which lanes are to be narrowed. (NACTO, 2013, p. 56). Depending on the context, the accommodations made may consist of refraining from reducing lane widths across the emergency route network, leaving some lanes wider or redesigning intersections where emergency services will have difficulty turning corners.

Related norms or bylaws

1) Even narrower traffic lanes (2.7 m) are frequently used in combination with other measures to calm vehicle traffic on local residential streets and to ensure compliance with relatively low traffic speed limits (often 30 km/h).[10]
2) Sidewalks with a minimum width of 1.8 m allow wheelchair users to pass one another, as is not the case for the more commonly-found 1.5 m wide sidewalks.
3) One-way cycle paths with a minimum width of 2.0 m enable passing, in contrast to those more commonly-found paths having a width of 1.5 m.

Implications for practice

The studies that we reviewed while preparing this document suggest that it may be beneficial to reduce traffic lane widths to 3.0 m in order to help reduce motorized traffic speeds and to create the space needed in built-up areas to better serve other street users, specifically pedestrians and cyclists. The literature also suggests that reducing lane widths to 3.0 m in urban environments does not lead to congestion and does not increase collisions, contrary to traditional thinking. Public health actors may therefore wish to advocate for the adoption of a norm to reduce the default traffic lane width to 3.0 m.

That being said, advocating for such a norm does not equate to campaigning for 3.0 m wide traffic lanes to be installed in every situation. This norm pursues a more modest objective by seeking to reverse the "burden of proof." Instead of having to justify the presence of 3.0 m wide lanes to enable the development of a cycle track, for instance, such a norm would require justification for the use of wider lanes.

According to their local contexts, public health actors must use their judgment as to whether it is preferable to advocate at the outset for such a norm to cover as many streets and lanes as possible, as presented in the *Model formulation for this norm* section on page 1, above, or for certain streets (e.g., arterials or streets with a speed limit of 60 km/h or higher) or lanes (e.g., lanes on busy truck and bus routes) to be excluded, as set forth in the *Alternate formulation* section above.

Public health actors may also advocate for the norm to be included in a guide for geometric street design or as part of a "complete streets" policy, thus leading towards gradual implementation as streets are maintained or built. If the environment in which they work is not ready to embrace a norm with such a broad scope, public health actors may wish to first try introducing a norm by way of specific pilot projects, such as road diets. This option would allow them to evaluate the impacts and drum up the political support necessary to broaden the scope if the results are deemed to be positive.

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[10] To find out more, please refer to the sheet in this series regarding the 30 km/h speed limit on local streets: http://www.ccnpps.ca/docs/2014_EnvBati_30KmHZone_En.pdf

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Author: Olivier Bellefleur, National Collaborating Centre for Healthy Public Policy

Editing: Michael Keeling and Marianne Jacques, National Collaborating Centre for Healthy Public Policy

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