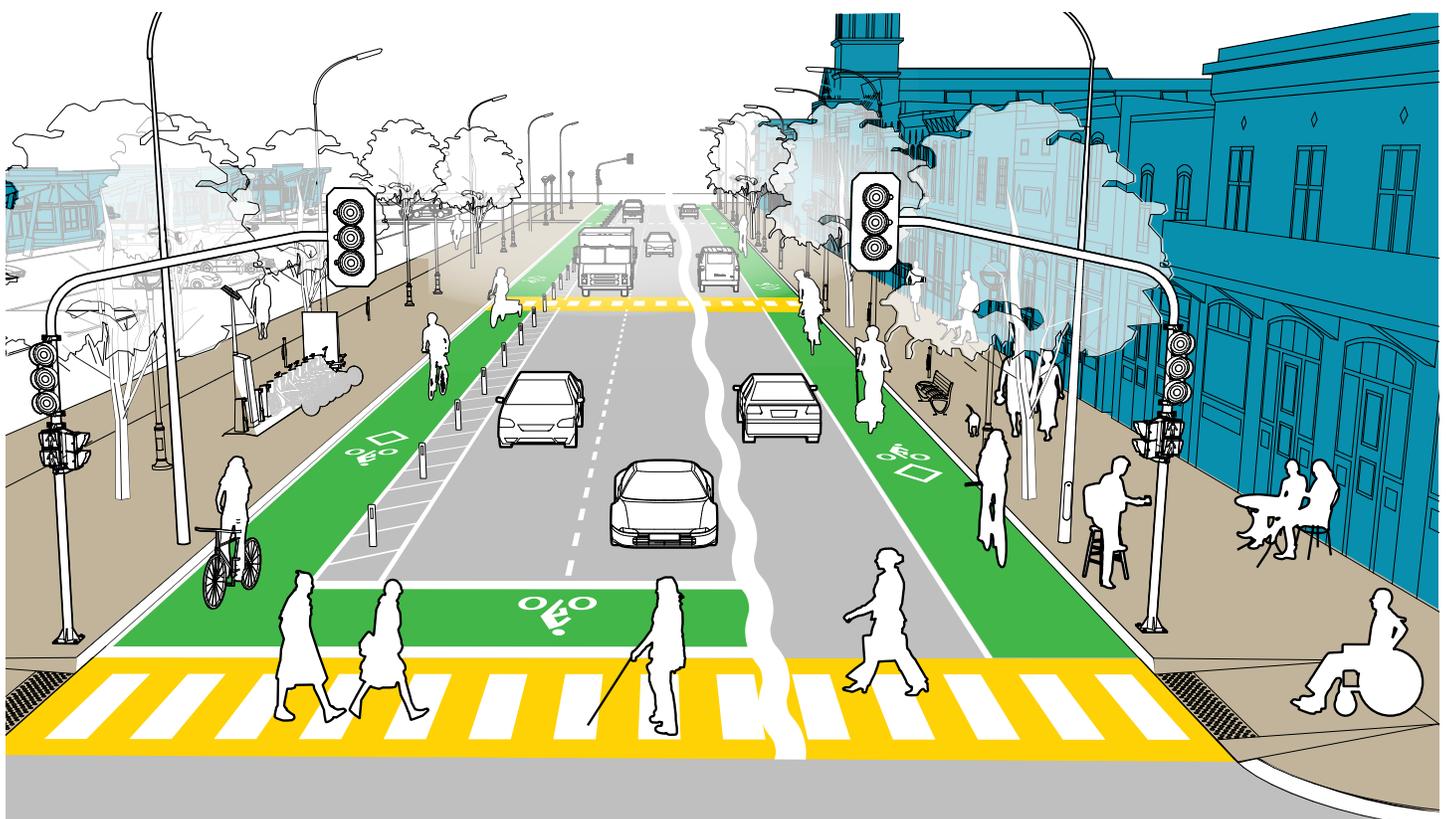


Healthy Streets

Design Features and Benefits

October 2014



416.338.7600 toronto.ca/health

 **TORONTO** Public Health

Reference

Toronto Public Health. Healthy Streets: Design Features & Benefits. October 2014. City of Toronto.

Copies

Copies of this report can be downloaded at: www.toronto.ca/health

For Further Information

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Most people know intuitively that our surroundings impact our health – clean water, safe housing, sanitary waste disposal, and clean air are all essential to any community that hopes to thrive. How we design our intersections, sidewalks, cycle ways and streets also impacts our health.

About this Document

This report highlights the health evidence and experiences of other cities as they shifted their focus from moving cars to moving people. Recognition that road ways are a finite urban resource has led to more egalitarian design decisions regarding the needs of pedestrians, cyclists, transit users and motorists. Complete Streets is a concept that guides road design for all ages, abilities and modes of travel. Expanded active transportation options enable residents to build physical activity into their lives every day, thereby reducing the risk of serious chronic diseases such as diabetes, stroke and heart attacks.

Complete Streets facilitate physical activity, improve traffic safety, and decrease exposure to harmful pollutants. This more encompassing role for streets includes not only moving people but also social, cultural, environmental and economic functions.

Toronto Public Health, in consultation with Transportation Services and City Planning, commissioned three reports about how the design elements of Complete Streets are associated with more active lifestyles and better health. A literature review examined the available health research. A jurisdictional review provided information from leading North American cities and their efforts in Complete Streets implementation. This document highlights the evidence and experience contained in these reports.

Toronto can learn from other major cities like New York City, Chicago, San Francisco and Boston that have embraced the concept of complete streets. They can inspire us by their examples of how they have re-invented their city environment from auto-oriented to more complete streets oriented, to bring vitality and social connectivity to their neighbourhoods. This report seeks to help all of us, whether the public, businesses, policy makers or elected officials to understand the impacts of a transformation to more complete streets.

For more detailed information and access to the full literature review, *Healthy Streets: Evidence Review* and *Healthy Streets: Jurisdictional Review* please go to:

www.toronto.ca/health/reports

Summary

Complete street policies dovetail with existing policies to provide universal accessibility or barrier-free travel.

People's decision to be physically active through walking and cycling can be influenced by the availability of streets and other facilities which allow for convenient routes to destinations in safe and enjoyable ways.

Complete Streets design decisions help to better accommodate pedestrians, cyclists, transit users, and other vulnerable users, rather than providing only for the needs of the automobile driver to the detriment of other groups.

Many positive health associations have been found between Complete Streets and:

- ◆ increased physical activity,
- ◆ increased traffic safety,
- ◆ lowered body weight, and
- ◆ improved physical, mental and social health.

Walking and cycling also produce no emissions, thereby contributing to healthier air.

Overall, high street connectivity has been linked to more physical activity and is widely recognized as being one of the most important features of an urban environment for promoting physical activity. Street connectivity, and the route directness it provides, increases the number of routes conveniently accessible to pedestrians and cyclists.

The choice of specific Complete Streets elements and their design characteristics to best promote health depends on the context of each specific street segment. It involves answering questions such as:

- ◆ Who are the current and expected future users?
- ◆ What are their needs?
- ◆ What health challenges exist or will exist?
- ◆ What existing opportunities can be leveraged for encouraging healthy living?

Urban design can influence health using three paths:

1. Improve Accessibility

Convenient access to destinations, such as residences, jobs, retail destinations, transit facilities, recreational amenities, and public services, is very important when making the choice to walk or cycle.

- ◆ Continuity of transportation, pedestrian and cycling facilities throughout the network is critical.
- ◆ Filling gaps where facilities are missing or inadequate is a key priority to improving accessibility.
- ◆ Providing street connectivity via short blocks and 4 way intersections or connections through existing long blocks is essential for minimizing travel distances.

2. Ensure Safety and Security

Having routes to destinations which are safe from motor vehicle collisions and crime is an important factor when deciding to walk or cycle.

- ◆ At a minimum, users need to have a safe, continuous network of sidewalks and cycle facilities, adequate lighting and safe intersection crossings.
- ◆ Depending on traffic and other locally specific conditions, other features should be considered to improve pedestrian/cyclist safety such as providing medians with pedestrian refuge, enhanced crosswalk and signalization treatment, curb extensions and other traffic calming features.

3. Enhance the Experience

Attractive street design and amenities encourage walking and cycling. Areas with good accessibility and safety can be further enhanced through the provision of wide sidewalks, commercial or public seating, trees, landscaping, human scaled buildings and attractive, transparent façade design.

“About 80% of Toronto residents surveyed have a strong preference for street designs that allow them to walk, cycle or take transit even if means that there is greater foot and car traffic on their streets.”

The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health, TPH 2012

Summary of Health Benefits

The three health paths are mutually reinforcing. Nearby destinations make walking and cycling more viable. Calmed traffic along the route to reach them further encourages increased activity and social interactions. In turn, additional activity has a further calming influence on traffic.

Improve Accessibility

The ability to access destinations within a convenient walking or cycling distance provides:

- ◆ more opportunities for physical activity, which in turn helps maintain a lower body weight and reduce risk for chronic diseases such as type 2 diabetes and cardiovascular disease,
- ◆ mental health benefits arising from regular physical activity for example: lower stress, depression and anxiety levels,
- ◆ neighbourhoods with improved accessibility can be linked to positive mental health, and
- ◆ health benefits are for everyone. Children who walk or cycle to school are more active during the day and are more fit, than those who do not.

Compact neighbourhoods with walkable streets and a variety of destinations within walking distance of housing are associated with:

- ◆ lower rates of obesity, and
- ◆ higher rates of physical activity.

Pedestrian and transit friendly environments enable people of all ages to have greater:

- ◆ travel independence, and
- ◆ possibilities for social interaction.

Ensure Safety and Security

- ◆ People who feel safe and secure from automobile traffic, other pedestrians and/or cyclists, will be more likely to walk or cycle.
- ◆ Enhanced lighting can help reduce threats from criminal activity.
- ◆ Buildings, transit waiting areas, and public spaces should be designed to minimize dark corners, dead ends, and isolated areas.
- ◆ Street design can reduce motor vehicle speeds, which helps to decrease the likelihood of collisions and their severity.
- ◆ Streets with many cyclists and pedestrians may also cause drivers to move more slowly and cautiously. This can cause a positive feedback loop, where the slower traffic speeds encourage yet more walking and cycling.

“There is a general awareness amongst the public at large about health issues and that makes it easier for them when they are in a community saying why they need a wider sidewalk or whatever at the expense of travel lane for cars.”

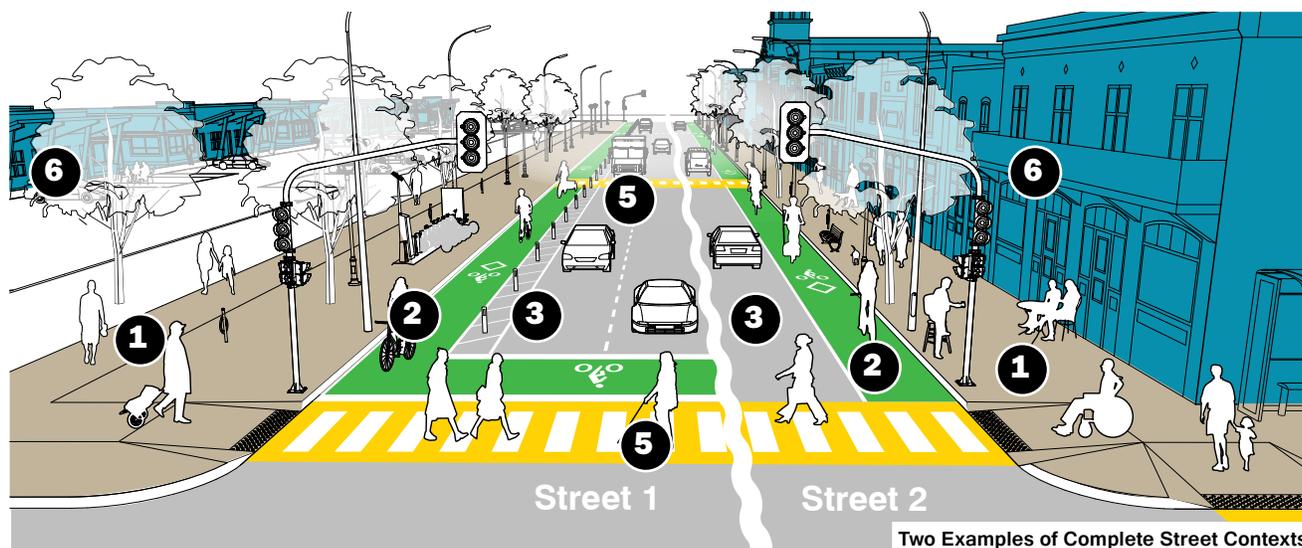
Vineet Gupta, Director of Policy and Planning, Boston Transportation Department. Boston, Massachusetts.

Enhance the Experience

Good street design positively influences mental and social health. An attractive street with seating, interesting destinations, and minimal disturbances from vehicular traffic helps to encourage social activity on the street.

Trees and vegetation are calming and promote better mental health. Exposure to vehicular exhaust can be reduced through traffic control, adjacent building design, and providing vegetation.

- 1. Pedestrian Space
- 2. Cycling Facilities
- 3. Roadway
- 4. Street Connectivity (not represented in the illustration)
- 5. Intersections and Crossings
- 6. Adjacent Buildings and Land Use



Report

Although all forms of transportation can be stressful at times, research indicates that driving is more stressful, more consistently, than other forms of travel. The absence of stressors such as noise, air and visual pollution are consistent with better mental health and create a more enjoyable walking or cycling experience.

The remainder of this report provides illustrations of specific street design choices that evidence indicates support healthier outcomes. Images and illustrations are drawn from examples of best practice in Toronto and internationally. It is organized using the following major Complete Street design categories (see above figure), as well as the paths that reduce health impacts:

- 1. Pedestrian Space
- 2. Cycling Facilities
- 3. Roadway
- 4. Street Connectivity
- 5. Intersections and Crossings
- 6. Adjacent Buildings and Land Use

In the text the specific design elements are labelled alphabetically. The same labelling system is used for their related illustrations.

Pedestrian Space

The pedestrian space is between adjacent buildings and the street curb. Typical elements include sidewalks, landscaping, street trees or other buffers, lighting, street furniture, transit stops and similar amenities. The design of these features helps to ensure a safe and inviting space for pedestrians with adequate separation from nearby vehicles.

Improve Accessibility

a. Continuous sidewalks are critical in affecting people's choice to walk. Proper attention must be paid to ensure the sidewalk is designed for universal accessibility, including meeting proper standards for people with disabilities.

b. Providing sidewalks and transit service enhances regional accessibility and the health of commuters. Research studies have shown that:

- ◆ transit users engage in more physical activity than non-transit users, and
- ◆ more physical activity and lower body weight is associated with higher densities of transit stops/stations or shorter distances from home to the nearest stop/station.

“ We know walkability is not just about the sidewalk, and that other elements, for example good connections to transit and local amenities, make a street more walkable.”

Chris Hodgson, P. Eng., Senior Project Engineer, Active Transportation & LRT Integration, City of Waterloo, Ontario.

Ensure Safety and Security

a. Sidewalks which are free of tripping hazards and obstacles have a clear positive influence on pedestrian safety.

- ◆ Trip and fall hazards hamper the ability to walk safely, especially for someone with vision impairments or balance/strength problems.
- ◆ Vehicle-pedestrian collisions are reduced by providing a place to walk adjacent to the roadway, on sidewalks.

Maintenance is needed for the safe use of sidewalks, including addressing:

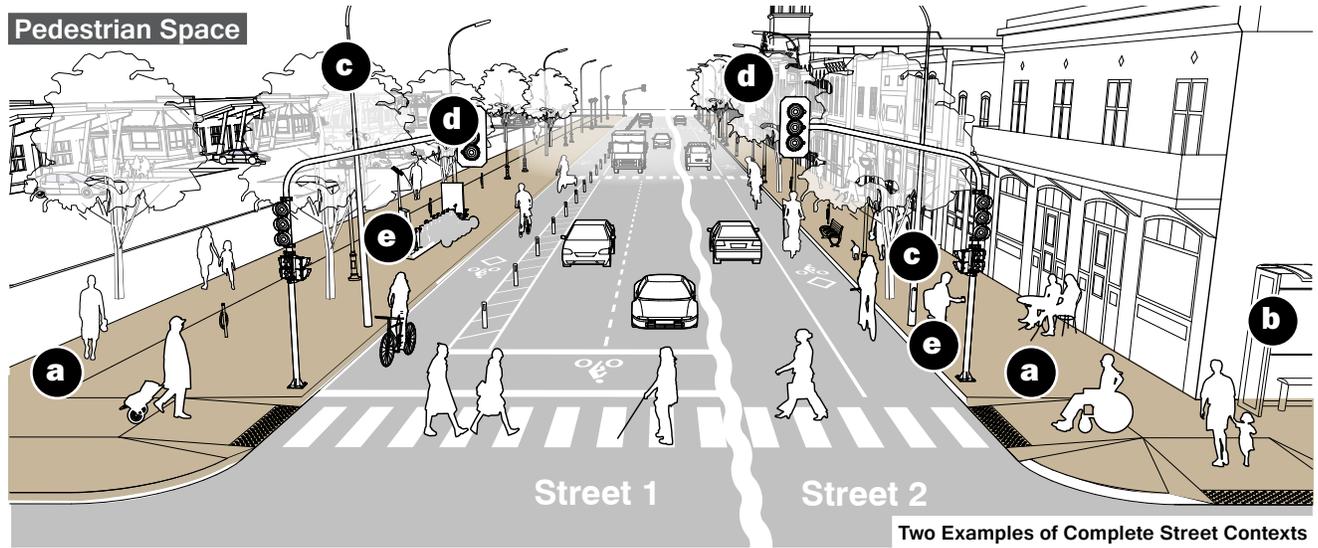
- ◆ uneven or broken sidewalk surfaces,
- ◆ narrowed areas due to the addition of sign posts, newspaper boxes and benches,
- ◆ untrimmed trees/bushes which hang over the sidewalk, and
- ◆ snow and ice clearing in the winter.

c. Lighting along street segments reduces pedestrian, bicycle and vehicle collisions at crosswalks, improves perceptions of safety and acts as a deterrent to criminal activity.

“ Crime prevention can be achieved through environmental design and lighting. These are well established principles.”

Paul Lippens, former Director of Planning, Active Transportation Alliance, City of Chicago, now Principal Planner, McKenna Associates. Chicago, Illinois.

- a. Sidewalk Presence & Width
- b. Public Transit Facilities
- c. Lighting
- d. Trees & Vegetation
- e. Buffer Zone



d. Tree-lined streets have been found to have lower collision rates than sections without trees.

- ◆ Trees can provide a visual constraint that signals to the driver to slow down, whereas a wide open view shed may encourage a driver to speed up.
- ◆ It is also possible that the presence of trees conveys a calming effect, as well as adding interest for the driver, encouraging slower speeds.

“If you are designing an auto oriented street then limit the street trees, ... but if pedestrians are first, then street trees are essential for improving their environment.”

Paul Lippens, former Director of Planning, Active Transportation Alliance, City of Chicago, now Principal Planner, McKenna Associates. Chicago, Illinois.

Urban trees are known to help reduce both gaseous and particulate air pollution. Individuals with more parks and tree-lined streets near their residence have been found to have a higher life expectancy.

Enhance the Experience

a. Sidewalk width and the presence of public seating are important predictors of social activity. Seniors have said that the presence of benches and other seating opportunities help facilitate more walking.

d. To increase people's comfort through the seasons, and to encourage walking and cycling, tree types should be selected to:

- ◆ maximize shading in the summer,
- ◆ allow sun penetration to sidewalks and open areas during the rest of the year, and
- ◆ reduce wind speeds year round.

In addition to providing shade and heat reduction, greater urban tree canopy can reduce harmful ultraviolet radiation exposure that leads to skin cancer.

e. Buffers between the sidewalk and the roadway are an important predictor of people's perception of walking attractiveness.

- ◆ Trees, benches, or other comfort amenities are associated with more walking.
- ◆ Access to nature and green space has a positive relationship with more physical activity and better physical, mental and social health.
- ◆ The quantity and quality of greenery visible along the streetscape have been shown to be both associated with better self-reported health, fewer acute health-related complaints, and better mental health status.
- ◆ Residents of tree-lined boulevards with landscaped medians have indicated less annoyance and better social conditions despite heavier traffic than residents on streets lacking these amenities.



Street Trees line Buffer Zone, Vancouver

Cycling Facilities

Cycling facilities include on-street cycle lanes and tracks, off-street paths, and parking. Cycle lanes are part of the roadway, but separated from traffic lanes by a painted stripe. Cycle tracks and separated bike lanes are part of the roadway, but physically separated from traffic lanes. Off-street paths are not part of the roadway, but they can be adjacent to it. They are often shared with pedestrians.

Improve Accessibility

- a.** A continuous and complete network of cycling facilities encourages cycling.
- ◆ It provides a means to use active transport to access local and regional destinations.
 - ◆ When effectively connected with transit (through access to stops/stations, bike parking racks and the ability to transport a bicycle on transit vehicles) the distances which can be comfortably covered approach those of the automobile.

“The focus is on creating safe and comfortable cycling facilities for users of all ages.”

Paul Lippens, former Director of Planning, Active Transportation Alliance, City of Chicago, now Principal Planner, McKenna Associates. Chicago, Illinois.



Separated Bike Lane, Montreal

Ensure Safety and Security

- a.** Widespread bicycle network improvements (including the construction of bike lanes and cycle tracks, on the road, but separate from traffic and the sidewalk) contribute to increased cycling activity and a reduction in bicycle collisions.

Most cycling collisions with motor vehicles occur at intersections when vehicles are turning, rather than at mid-block where vehicles are going straight.

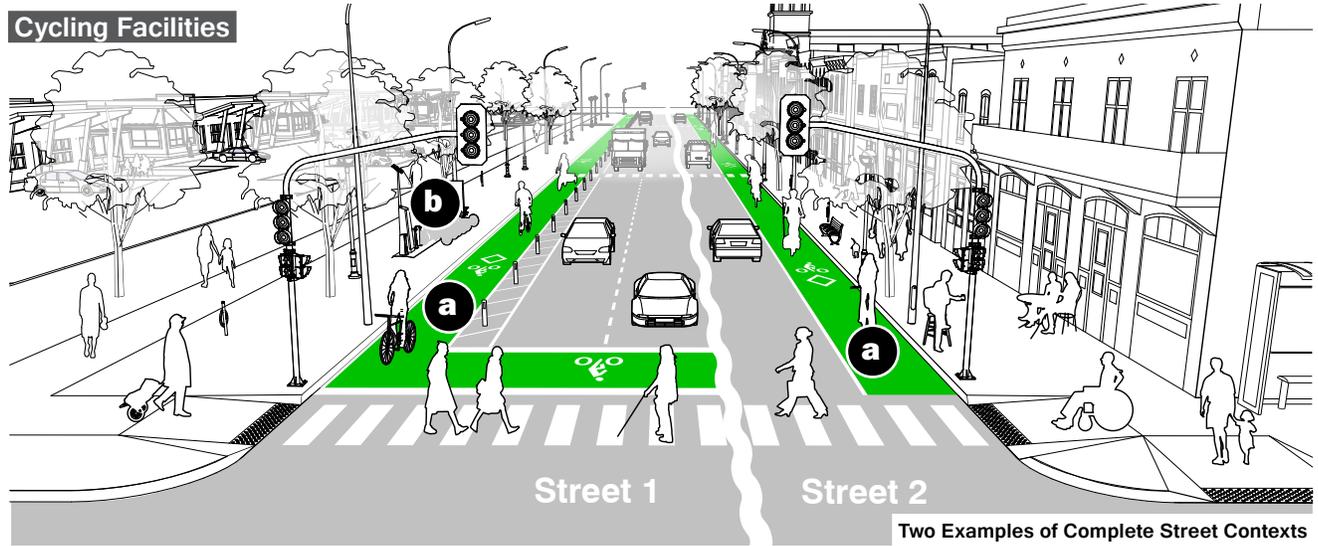
- ◆ The number of vehicle turn lanes and the sight lines must be managed carefully as they contribute to how safe the intersection is for vulnerable road users.
- ◆ One-way cycle tracks have been found to be safer than two-way facilities.
- ◆ Cycle tracks have also been found to be safer for cyclists at non-intersection locations as compared to riding on streets with no cycling facilities.
- ◆ Among the least experienced cyclists, separated paths (such as multi-use trails) are often most preferred as they are perceived to be the safest. If the points at which the trails cross roadways are not managed properly, the trail users can be vulnerable to collisions.

“There is now enough evidence to know that protected bike lanes (such as cycle tracks) are safer than conventional bike lanes.”

Paul Lippens, former Director of Planning, Active Transportation Alliance, City of Chicago, now Principal Planner, McKenna Associates. Chicago, Illinois.

Most cases of “dooring” (when a cyclist is struck by a car door being opened) occur on arterial roads in central Toronto with high-turnover curbside parking. Dooring can result in the cyclist falling into traffic, which can contribute to more serious injuries as compared with other types of collisions.

- a. Cycle Tracks and Bike Paths
- b. Bicycle Parking



Enhance the Experience

A community's bikeability is positively impacted by:

- ◆ route and trail continuity,
- ◆ good surface conditions (e.g. no potholes, broken/rough/uneven pavement, or debris/litter),
- ◆ intersections with traffic signals providing sufficient time for cyclists to cross, and good visibility for oncoming traffic.

“It's common sense that if you provide a well-planned network of bicycle facilities, people will use them and improve their health.”

Nick Peterson, Division of Traffic & Planning/Public Space, New York Department of Transportation

b. Bicycle parking can increase:

- ◆ the perceived convenience of cycling,
- ◆ the likelihood of cycling, especially for sheltered and secured bicycle parking.

Shifting travel from polluting modes to cycling helps reduce overall pollution levels.

- ◆ Cyclists can minimize their exposure by choosing low-traffic routes whenever possible.
- ◆ The physical activity benefits of cycling have been found to outweigh the health risks related to pollutant exposure and collisions.

“Emission reduction is a key consideration to improve both the health of the environment and people and therefore motivates implementation of complete street designs that make choosing active transportation safer and more inviting.”

Timothy Papandreou, Director, Strategic Planning & Policy, San Francisco Municipal Transportation Authority, City of San Francisco, California.



Bike Post, Toronto



Bike Shelter, Victoria



Bike Corral, Chicago



Cycle Track, Toronto

Roadway

Roadway design elements include the number and width of vehicular lanes, medians, traffic calming features, and mid-block crossings.

Ensure Safety and Security

The design of the vehicle roadway can reduce traffic volume and speed, and can:

- ◆ increase people's willingness to walk and cycle,
- ◆ decrease pedestrian/cyclist collision risk with vehicles,
- ◆ increase the chance of surviving a crash, and
- ◆ decrease air and noise pollution from vehicular traffic.

a. Street Width/Total Number of Lanes

A typical “road diet” consists of removing one lane in each direction of a four-lane street section. The road space previously assigned to the two removed lanes is then re-purposed for such things as a centre turn lane, landscaped median, cycle lanes, or wider sidewalks. In many cases, road diets occur where there is currently excess road capacity for motor vehicles. Collision rates tend to be higher for wider roads.

Appropriately applied road diets can:

- ◆ reduce vehicle speeds and collisions,
- ◆ increase cycling activity.

Minimizing road widths (crossing distances) is especially important for seniors and pedestrians with disabilities.

b. Narrow Lane Width

Narrower lanes help to calm traffic and expand options for including cycle lanes, sidewalks, trees, etc. They have been found to:

- ◆ reduce vehicular travel speed, as the constraints of the lane force drivers to operate more cautiously,
- ◆ decrease the likelihood of collisions, due to slower motor vehicle speeds, and
- ◆ reduce severity of injuries in the event of collisions.

“Enough research has been done to know that narrow traffic lanes are safer because they slow down traffic.”

Vineet Gupta, Director of Policy and Planning, Boston Transportation Department. Boston, Massachusetts

