

**Designing Major Urban Road Corridors for Active Transportation:
The Ottawa Case**

Ronald A. Clarke, MCIP, RPP
Manager of Planning, Delcan Corporation



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ABSTRACT

The aim of this paper is to reinforce the importance of designing major urban road corridors to support active transportation ... walking, cycling, and other non-motorized modes. This implements ongoing public policy thrusts towards sustainable transportation and increasing public health concerns associated with an automobile dependant society. Major roads including arterials, major collectors, and collectors are often the best candidates for this multi-modal function. They typically link a wide range of destinations, and the investment in pedestrian-friendly and cycling-friendly infrastructure can yield the greatest returns for a municipality.

The City of Ottawa continues to show leadership in active transportation and this follows a long history of progressive municipal policy. In this decade, the City has published Design Guidelines to influence the construction and reconstruction of its network of major roads in this regard. A fundamental principle of the Guidelines is that major roads must be considered as part of the City's network of public spaces, not just traffic carrying devices. A related fundamental principle is that designs must take into account the total road corridor, including the broader civic context and adjacent land uses.

A sampling of Ottawa's design solutions and road cross-section demonstrations is provided. A "family" of road types is introduced. These are referenced from the City's *Regional Road Corridor Design Guidelines* (2000) and its *Road Corridor Planning and Design Guidelines* (2008). The design solutions illustrate how the competing space requirements of various road users can be balanced, often within narrow road right-of-ways. Road corridors that form good public spaces, that provide appropriate property access, that sufficiently accommodate services and utilities, and that are safe and comfortable for all transportation modes can result.

1.0 INTRODUCTION

1.1 Background

The City of Ottawa is demonstrating leadership in design for active transportation and sustainable transportation systems. Its award-winning *Regional Road Corridor Design Guidelines (2000)*¹ were referenced as a *Research Highlight*² by the Canada Mortgage and Housing Corporation and have been referenced by municipalities across Canada. At the turn of the new millennium, the guidelines were leading-edge in their emphasis that Arterial Roads must be thought of as the key fabric of the City's public space system, while providing mobility choices, access to lands, and space for municipal services.

The Guidelines built on themes being promoted in the Portland, Oregon region where the concept of "livable streets"³ was introduced, and in California where City engineers and planners who were planning for walkable communities were questioning, "how did current standards become the norm?"⁴. The Guidelines continue to influence the design of the Ottawa's network of major roads.

Ottawa's recently published *Road Corridor Planning and Design Guidelines (2008)*⁵ are a companion document that furthers the City's reputation for progressive design, with a focus on collector roads and rural roads. Together, these documents provide a useful baseline for other Canadian Cities seeking to adopt a progressive approach toward the design of healthy, livable streets.

1.2 Purpose and Objectives

The purpose of this paper is to demonstrate the importance of taking a broad view of "design" when building or reconstructing major urban roads in order to maximize use by alternative transportation modes. Major urban roads include arterials, major collectors and collectors located in settlement areas. A broad view is required not only in terms of the wide range of geometric design, urban design, and infrastructure elements to be considered, but also in the role of the road corridor and the wider geographic context that it fits into. On this basis, the objectives of the paper are as follows:

- To reinforce the need to plan for sustainable transportation systems in Canadian cities and the importance of road corridors that support "active transportation" including pedestrian and cyclist use;
- To provide an overview of the City of Ottawa policy context and the municipality's emphasis on both geometric and urban design;
- To emphasize the need to view major roads as public space corridors within a varying context that is much wider than just their right-of-ways;
- To introduce a sampling of road design solutions used by Ottawa that lead to pedestrian-friendly and cycling-friendly streets; and
- To demonstrate how a wide range of modes can be accommodated in relatively narrow right-of-way cross-sections for major roads.

The aforementioned road design guidelines published by the City of Ottawa will be used as a framework to fulfill the paper’s objectives. The Guidelines are available on the City of Ottawa website at <http://www.ottawa.ca>.



Figure 1: Regional Road Corridor Design Guidelines



Figure 2: Road Corridor Planning and Design Guidelines

2.0 SUSTAINABLE ROADS AND ACTIVE TRANSPORTATION

2.1 Sustainable Roads

In the pursuit of sustainable communities across Canada and around the world, it is recognized that the transportation component is one of the primary determinants of sustainability. Canada’s Centre for Sustainable Transportation broadly defines a sustainable transportation system as one that:

- *Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.*
- *Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.*
- *Limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.*⁶

Globally, the push for sustainable transportation systems has for several years been most associated with climate change and air quality mitigation strategies. This is based on an understanding that motor vehicles are a notable contributor of greenhouse gas (GHG) emissions and other pollutants. Despite increasing public policy support for sustainable transportation solutions, growth in the automobile sector and its supporting infrastructure has not stalled:

The inescapable fact is that more roads are being built around the world and that an estimated 70 million road vehicles enter the market every year.⁷

Transport Canada reports⁸ that there is more than one million km of two-lane equivalent public roads in Canada and that transportation sector results in approximately 25% of Canada's total GHG emissions. Of this, 75% is attributed to on-road emissions. This alone is a compelling rationale for municipalities to pursue active transportation strategies that reduce car dependency. This thrust can run in parallel with other emphases on transportation demand management, intelligent transportation systems, transit oriented communities, goods movement, and off-road transportation systems.

The body of knowledge linking automobile use with greenhouse gas emissions, urban air quality, and costs of urban congestion is continually being augmented by Transport Canada, the Transportation Association of Canada (TAC)^{9,10} the Canadian Institute of Transportation Engineers¹¹, and many other agencies. Policies and programs to promote non-automobile travel are universally embraced across Canadian cities and efforts are ever-increasing.

2.2 Active Transportation and Road Corridor Design

More recently, the connection between automobile dependency and public health has become a public policy focus separate from the climate change emphasis. Transport Canada advises that, "sustainable and active transportation has a key role to play in improving the health of Canadians".¹² There are increasing concerns regarding climbing obesity rates and associated ailments such as diabetes, hypertension, heart disease and some cancers:

Over half of Canadians carry some excess weight and two-thirds of these are considered to be at probable health risk. Obesity in children and youth increased by over 50 percent between 1981 and 1988 alone.¹³

Obesity is in part associated with a passive lifestyle and is more and more frequently being linked to passive transportation (automobile use) as one of many causes. Physical activity has been a focal point of the health industry in stemming this tide of obesity¹⁴. These health concerns are in addition to the much-studied health related effects of diminishing air quality. The net result is a widened arena of transportation policy interest that now includes many health agencies. For example, the Public Health Agency of Canada is now promoting "active transportation":

Active transportation is any form of human-powered transportation. It is any trip made for the purposes of getting yourself, or others, to a particular destination - to work, to school, to the store or to visit friends. As long as it is "active", you can choose the mode - walking, cycling, wheeling, in-line skating, skateboarding, ice skating (eg. on a canal). Walking and cycling are the most popular forms of active

*transportation. It can also involve combining modes such as walking/cycling with public transit.*¹⁵

The benefits of active transportation as presented at the 2003 National Round Table on Active Transportation include:

- *Improved health and recreation from increased physical activity;*
- *Health and environmental benefits from reduced air pollution;*
- *Health and economic benefits from reduced crashes;*
- *Traffic congestion reduction;*
- *Road and parking cost savings;*
- *Consumer cost savings;*
- *Improved mobility for non-drivers;*
- *More livable communities; and*
- *More efficient land use patterns.*¹⁶

If Canadian cities are to embrace active transportation and pursue these benefits as part of their sustainable transportation strategy, it is clear that they must design roads that comfortably accommodate walking and cycling and similar modes in addition to motorized vehicles. Road corridors must truly become multi-modal in their function. This is especially important for major urban roads since these are the routes that best connect the widest range of land uses and destinations in urban areas.

Accordingly, geometric and urban design solutions favouring active transportation must be built into new roads and into the reconstruction of existing roads, without compromising the utility or safety of any mode. Lessons can be learned from the City of Ottawa experience in this regard.

3.0 THE OTTAWA CONTEXT – AN EMPHASIS ON DESIGN

3.1 Evolving Policy Support for Sustainable Roads

Ottawa has a twenty year history of plans that have paid attention to sustainable roads, with areas of focus evolving over time. In earlier plans such as the Official Plan of the Regional Municipality of Ottawa-Carlton (1988), major roads were still thought of as having the primary function, “to carry traffic, of all types, safely and efficiently ... regional roads are for use by private vehicles, commercial traffic, and public transit services”.¹⁷ That Plan did introduce the need for alternative travel modes, but tied this primarily to the objective of energy conservation. An on-road bikeway network was established, but limited to a handful of arterial roads. While policy support for transit infrastructure was strong, the pedestrian and cycling policy was limited to less than twenty lines of text ending on the very last page of the Official Plan.

Notwithstanding the limited policy statements at the regional level, the planning focus on alternative transportation modes in the Ottawa area continued to grow in the early

1990s, with a focus on cycling. Area municipalities undertook a collaborative effort in 1994 which produced a *Cycling Transportation Network and Comprehensive Cycling Plan*.¹⁸ This plan established a region-wide network of on-road and off-road cycling routes. A family of cycling facilities emerged and basic design guidance in regards to lane widths, offsets, slopes, surfaces, intersection treatments, signage, pavement markings, and lighting was provided.

By the late 1990's, the national capital's modern focus on sustainable transportation had taken root in policy. The 1997 Regional Official Plan called for, "increasing the provision and use of environmentally-friendly transportation alternatives".¹⁹ Modal share targets for walking, cycling and transit use were introduced. The Cycling Transportation Network was instituted in the Official Plan and most arterial roads were now recognized as having an important on-road cycling function. That plan also included a policy that required the municipality to:

*Review roadway design guidelines to ensure that they incorporate value engineering principles, respect community values and reinforce Council's preference for walking, cycling and transit use over the use of the private automobile.*²⁰

It was this Council direction that resulted in the *Regional Road Corridor Design Guidelines* (RRCDG).

3.2 Current Focus on Active Transportation and Community Design

The Ottawa region was subject to a municipal restructuring process in 2000 which led to the amalgamation of the former Region of Ottawa-Carleton and its member municipalities into one large City of Ottawa structure. The new City adopted its first Official Plan in 2003. This Plan built on the former Regional Official Plan and the former City of Ottawa Official Plan and established a guiding principle to:

*favour walking, cycling, and public transit over the use of private automobiles, thereby facilitating the use of modes of transportation that are socially accessible, environmentally healthy and economically feasible.*²¹

The new Ottawa Official Plan continued to provide support for active transportation modes, and called for the adoption by the City of a *Pedestrian Plan* and a *Cycling Plan*. These plans have benefited from much public involvement. Both are currently in draft form and may be approved in 2008.

The 2003 Official Plan also has an emphasis on community design. New communities are to be planned on the basis of "Community Design Plans" that are to address infrastructure, land use, open space and built form in a holistic manner. In addition, the Official Plan's design emphasis has spawned various design guidelines, including: *Urban Design Guidelines for Greenfield Neighbourhoods*, *Urban Design Guidelines for*

Large Format Retail, Urban Design Guidelines for Drive-Through Facilities, and Urban Design Guidelines for Gas Stations.

The recently published *Road Corridor Planning and Design Guidelines* are a part of Ottawa's broad family of design guidelines. Together, the guidelines are intended to promote prosperous, green, livable, caring, healthy and active communities across the City.²²

4.0 DESIGN FOR ROADS AS PUBLIC SPACE CORRIDORS

4.1 The Public Space and Total Corridor Context Principles

To successfully accommodate active transportation modes along major urban roads, it is essential that road designers view roads as one of a city's most important public spaces, if not *the* most important. This paradigm shift in thinking emerged in the mid-1990's:

*If we can develop roads that are attractive public spaces, community-building places, then we will have successfully designed one third of the city and will have an immense effect on the rest.*²³

The public space principle was embraced by Ottawa and is a cornerstone of its two sets of road design guidelines. Major roads are to be designed as secure, comfortable, convenient, engaging to the eye, spatially defined, green, and universally accessible places. This is an especially important objective for major roads that often carry the highest volumes of traffic at the highest speeds. If planned for a single use purpose, such as was often the case historically, major roads will not be a highly valued public asset. They will even fail the utilitarian test now that walking and cycling are recognized as fundamental transportation functions for major roads.

Dating back to 2000, Ottawa understood that the "roads-as-public space" principle can only be pursued if roads are: 1. considered as a "corridor", and 2. designed to match a frequently varying urban context.

The total corridor approach requires the road designer to consider not just the right-of-way, but also the adjacent lands. This can be a difficult design basis because the adjacent lands are most-often privately owned and out of the control or current scope of work of the road designer. However, it is the inter-

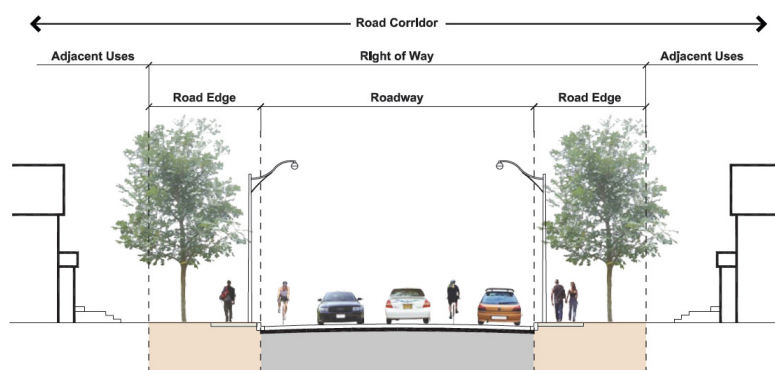


Figure 3: The Total Road Corridor Approach

relationships and interfaces between road corridor components that create the most favourable environment for walking and cycling when seamlessly designed. These components include: 1. adjacent lands; 2. the road edge; and 3. the roadway.

A road's varying context is another challenge often faced by road designers. Roads are easiest to design when considered as long and relatively homogeneous segments. One set of design criteria can be established and then systematically applied. The problem is, however, that roads in urban settings rarely have consistency in their adjacent land use and urban form. This has been recently captured in the move towards "Context Sensitive Solutions" and its advantages in promoting active transportation:

Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist.²⁴

A wealth of information is available on this modern theme and on the need for a corresponding "flexible design"²⁵ approach such Ottawa has employed.

4.2 Ottawa's Family of Major Road Corridor Types

The context sensitive approach was, in fact, the basis of Ottawa's road corridor design guidelines dating back to year 2000. The total "corridor" approach is imbedded even in the title of the documents. Both the *Regional Road Corridor Design Guidelines* and the *Road Corridor Planning and Design Guidelines* work together to create a "family" of major road types that correspond to their urban setting and that can play a public space function. The comparative characteristics²⁶ used to develop Ottawa's typology are as follows:

- Prevalent land use designation;
- Prevalent adjacent land use context;
- Prevalent adjacent lot sizes and access;
- Prevalent adjacent building scale and orientation;
- Landscape and visual environment;
- Typical roadside drainage;
- Typical length and connectivity;
- Traffic lanes and parking;
- Traffic volumes and speed and
- Arterial, Major Collector, or Collector classification.

After applying these criteria, it was determined that nine (9) road types would cover approximately 90% of the City's major road network. This family of major urban roads is presented on Table 1.

Table 1: Ottawa’s Family of Major Urban Road Corridors

	Road Type	Community Context	ROW Width Range (m)	# of Travel Lanes
	ARTERIALS			
1	Suburban Business/Institutional	Business parks and industrial areas	37.5 - 44.5	4 - 6
2	Suburban Commercial	Outlying commercial strips	37.5 - 44.5	4 - 6
3	Suburban Residential	Outlying residential areas	30 - 44.5	4 - 6
4	Urban Main Street	Main streets	20 - 26	2 - 4
5	Urban Residential	Inner city residential areas	20 - 26	2 - 4
6	Urban Core	Downtown or town centre mixed use areas	20	2 - 4
	MAJOR COLLECTORS & COLLECTORS			
7	Business Area Collector	Business parks and industrial areas	26	2
8	Community Collector	Residential and mixed use areas	20 - 26	2
9	Neighbourhood Collector	Residential areas	20 - 26	2

The important distinction is that these various road types augment the historical traffic engineering hierarchy of arterial roads, major collector roads, and minor collector roads. That hierarchy had a narrow focus on just the traffic carrying capacity and access restriction characteristics of the roadway. The modern system allows the roadway, road edge, and adjacent lands to be considered as a seamless unit that will achieve the broadest possible objectives for transportation, land use and urban design.

5.0 ADJACENT LAND DESIGNS FOR ACTIVE TRANSPORTATION

It is important to consider major urban roads as community connectors rather than community dividers. When the road corridors serve to connect uses across and along the corridor, this creates the greatest propensity for high levels of pedestrian and cycling activity and community cohesion²⁷. Ottawa’s road corridor design guidelines promote the following planning principles.

1. Locate buildings close to the road edge to spatially define the corridor

Roads as community connectors can be accomplished when adjacent land uses and buildings are located close to major roads. This is contrary to some historical practices where buildings were permitted and even required (in zoning by-laws) to be set far back from the road right-of-way. This habit negated the ability to frame any public space between buildings on either side of the roadway and

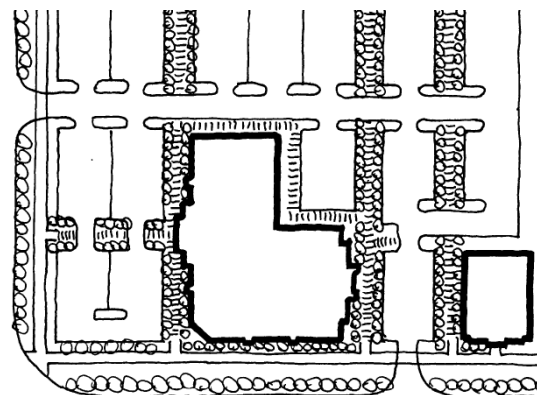


Figure 4: Buildings Should be Oriented to and Connected to the Road

drew pedestrians and cyclists off of the street's sidewalks. It left an often sterile pedestrian realm along the road edge.

2. Locate parking to the side or rear of buildings and buffer it from the pedestrian realm

Provision of parking to the side and rear of buildings is another important ingredient in walking and cycling-friendly streets. This often is a by-product of encouraging buildings to be located along the street lot line. Where parking is required along the road edge, it should be buffered from the sidewalk through effective landscaping. This will ameliorate the climate extremes that can result from large asphalt areas along walking routes.

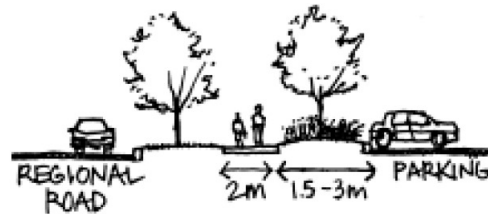


Figure 5: Road Edge Landscape Buffers Create a Favourable Pedestrian Realm

3. Orient and connect buildings to the road

Buildings along the road edge must not only be located near to the street lot line, the building must functionally relate to the street. This means that the building façade and signage should be street oriented, and direct sidewalk connections to resident or customer entrances should be provided.

4. Locate taller buildings along the road and keep the corridor narrow

Pulling taller buildings up to the street lot line has the additional effect of reducing the corridor's "building height to corridor width" ratio. This is essential to creating a spatially defined public space along the street. Where a more "urban" character is intended, tighter ratios (1:1 to 1:3) should be targeted. Height ratios of 1:6 (height to corridor width) should be avoided in most circumstances.

5. Consolidate road access and provide frequent intersections

Vehicular access to parking lots should be consolidated where possible. This will reduce the number of driveways that interrupt the pedestrian zone along the road edge, and will typically improve traffic operations. Consolidated property access also often results in controlled and relatively frequent intersections that in turn provide safe corridor crossing routes for pedestrians. Access consolidation can be accomplished by a range of techniques including shared parking lot arrangements, rear service lanes, or tightly spaced intersecting side streets. For residential areas, this places the outdoor amenity area to the rear of the building and avoids the need for noise attenuation fences. This pattern results from community designs that employ the traditional grid system.

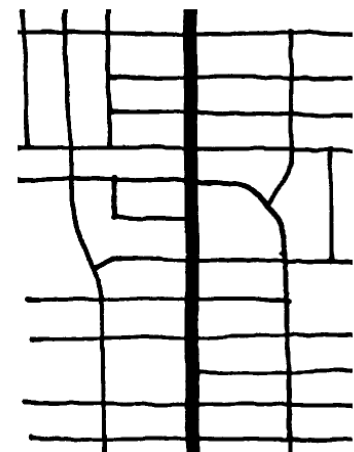


Figure 6: Frequent Intersections Promote Community Cohesion

6.0 ROAD EDGE DESIGNS FOR ACTIVE TRANSPORTATION

Road designs that favour walking are those that create comfortable and convenient pedestrian realms between the vehicle lanes and the right-of-way limit. Ottawa refers to this as the road edge. The following are some of the key design directions found in the City's road design guidelines.

1. Provide a wide, green street edge

Road edge zones of 6.0m to 7.5m are sufficient to provide green boulevards on either side of the sidewalk. This space can usually be accommodated on roads with right-of-ways of 24m or more. With this width, the inner and outer boulevards are sufficient to provide suitable space for planting as well as snow storage, which is extremely important in the Nation's Capital. Where lesser widths are available (such as on traditional mainstreets), special designs such as structural soil or tree wells are used by the City to incorporate trees along the curb zone.

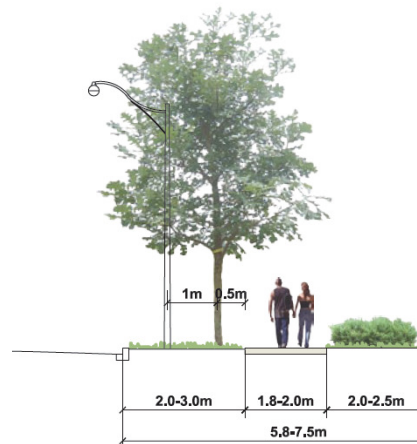


Figure 7: Road Edges of 6.0m to 7.5m
Provide Generous Pedestrian Amenity

2. Provide wide unobstructed sidewalk systems

Ottawa's standard sidewalk width is 2.0m (minimum) along its major roads. This width has been shown to be necessary to permit sidewalk users of all modes (pedestrians, wheelchair users, etc) to pass each other comfortably. In urban settings, it is important that this 2m clear zone is maintained free of signs, parking meters, bike racks, and other street furnishings. Many other sidewalk details are used by the City to provide universally accessible sidewalk system. This includes tactile surfaces and warning bars in advance of signalized crosswalks.

3. Buffer pedestrians from travel lanes

The most successful pedestrian zones along major roads are those where people feel separated from vehicles that are often traveling in high volume and at relatively high speeds. Planting trees along the sidewalk is essential for successful sidewalks, and the trees should be planted between the curb and sidewalk whenever feasible. On-street parking is also highly important in separating pedestrians from cars.

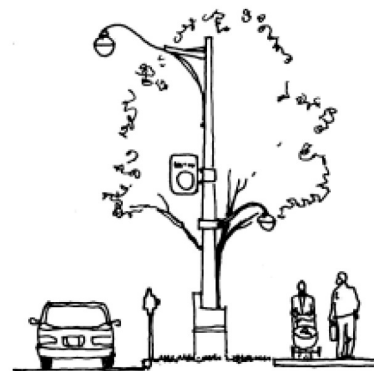


Figure 8: Trees, On-Street Parking, and
Street Lights Can Serve to Separate
Pedestrians from Vehicles

4. Provide street amenities for pedestrians (including transit users) and cyclists

The amenity needs of pedestrians and cyclists are relatively few and represent a wise investment when constructing city streets. Benches, "ring and post" bike racks, garbage containers, and transit shelters are relatively inexpensive and affordable to maintain. They can often be grouped together at bus stops along major roads together with community mail and newspaper boxes.

5. Use curb extensions

Curb extensions or “bulb-outs” are commonly used by Ottawa both in the construction of new streets and in retrofits in older neighbourhoods. These are clever ways of enlarging the road edge to provide additional space for bus shelters, grass and trees. When used at intersections, they also are effective at narrowing pedestrian crosswalk distances.

6. Consider multi-use pathways in special circumstances

The Nation’s Capital is reknowned for its network of multi-use pathways, largely those provide by the National Capital Commission. Recreation paths are also provided along some municipal streets, such as in instances where road segments best connect missing links in the Capital’s integrated federal/municipal recreation path system. A 3.0m width is appropriate for a mix of walking, jogging, roller-blading and cycling.

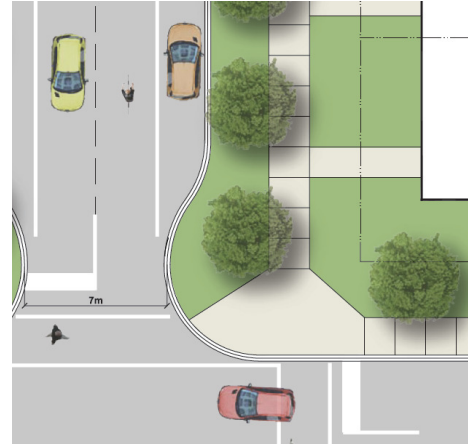


Figure 9: Curb Extensions Result in Useful Road Edge Space

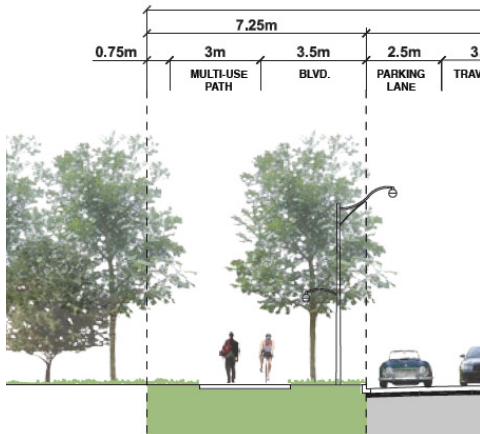


Figure 10: 3.0m Wide Recreation Paths May Be Appropriate Along the Road Edge in some circumstances

7.0 ROADWAY DESIGNS FOR ACTIVE TRANSPORTATION

The roadway portion of the road corridor includes the travel surfaces located between the road edges (typically between the curbs). Ottawa's road design guidelines have an emphasis on cycling as a prominent travel mode along the roadway, not as an alternative mode. This philosophy is also reinforced in the Ottawa Cycling Plan²⁸. An overview of the City's design direction for the roadway portion is provided below.

1. Provide on-road cycling facilities

Ottawa uses a wide range of designs to enable safe and convenient on-road cycling. Dedicated cycling lanes ranging from 1.5 to 2.5m wide are used typically along four-lane divided arterial roads. They have also been used in road retrofit cases where four lane roads are converted to two vehicle lanes plus two bike lanes. Wider shared lanes ranging from 4.0 to 4.5m in width are favoured along roads with lower speeds and volumes, and on roads that have on-street parking. Many segments of Ottawa's road network are included as signed cycling routes. Special route markers are installed along these routes.

2. Use special intersection treatments

Ottawa's Cycling Plan also emphasizes special designs to make intersections more cyclist-friendly. This includes special traffic signal timing, quadruple loop detectors, special directional pavement markings, turn and entry restrictions, and "bike pockets". Roundabouts are also increasingly used in Ottawa, and can be cycle-friendly, particularly single lane roundabouts.

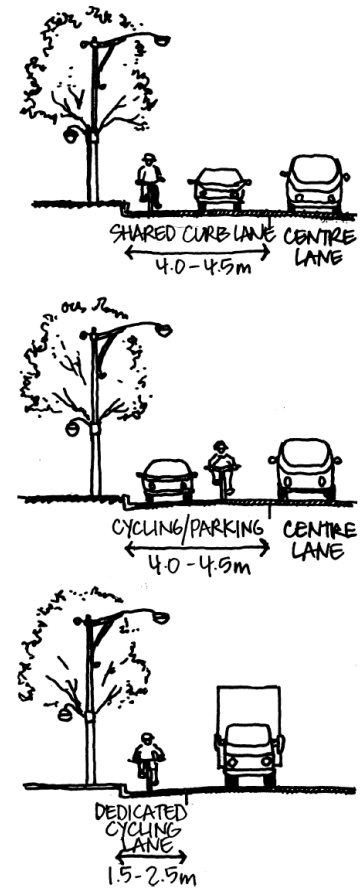


Figure 11: A Range of On-Road Cycling Facility Designs Are Appropriate To Fit Many Contexts

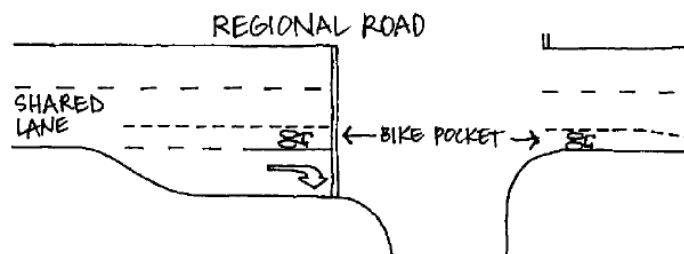


Figure 12: Bike Pockets At Intersections Provide For Safer Cycling

3. Provide curbs and curb-face inlets

Roadside drainage is an important consideration when designing roads that are cyclist-friendly. In Ottawa, cyclists prefer barrier curbs to delineate the roadway edge. Curb face inlets are now a standard design detail, in large part due to their favour by cyclists (as opposed to catch basin grates which can be a hazard).

8.0 ROAD CORRIDOR DESIGN DEMONSTRATIONS – FITTING IT ALL IN

8.1 Right-of-way Considerations and Road Diets

Good road design must find ways to balance the many interests that compete for often limited horizontal and vertical space. The surface components of the road edge and roadway can be difficult to arrange, and the challenge is heightened when considering the space requirements of underground services and utilities and the conflicts that can arise in urban areas. Community planning objectives and land development economics compound the problem wherein there is pressure for narrower road right-of-ways. As an example, the City's standard right-of-way width for residential collector roads has in recent years been reduced from 26m to 24m.

The design challenge is often focused on the road edge. This is the zone where utility/servicing conflicts are prevalent, where the stakes are highest in terms of active transportation objectives, and where trade-offs are most often made. Ottawa has had some successes with a *Utility Coordinating Committee* that includes a cross-section of professionals and organizational interests. Creative solutions such as utility easements on adjacent private land is one way that the City manages to balance user requirements within narrow road right-of-ways.

Recent publications on “road diets”²⁹ have emphasized the benefits of reducing the number of vehicle lanes in favour of on-road cycling amenities and/or wider road edges. Ottawa has various examples where four-lane roadways have been converted to two-lanes, with the benefit going to active

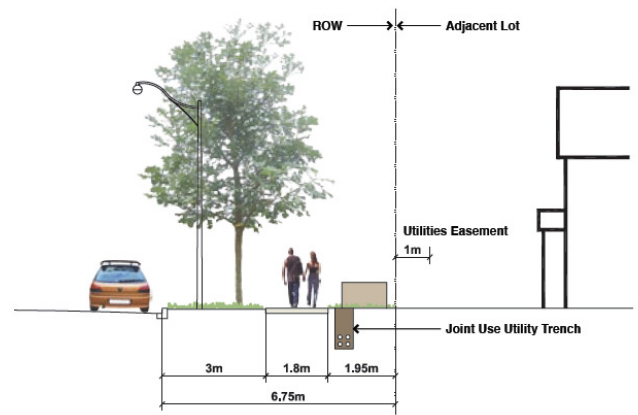


Figure 13: Utility Easements on Private Land Can Reduce Right-of-Way Requirements

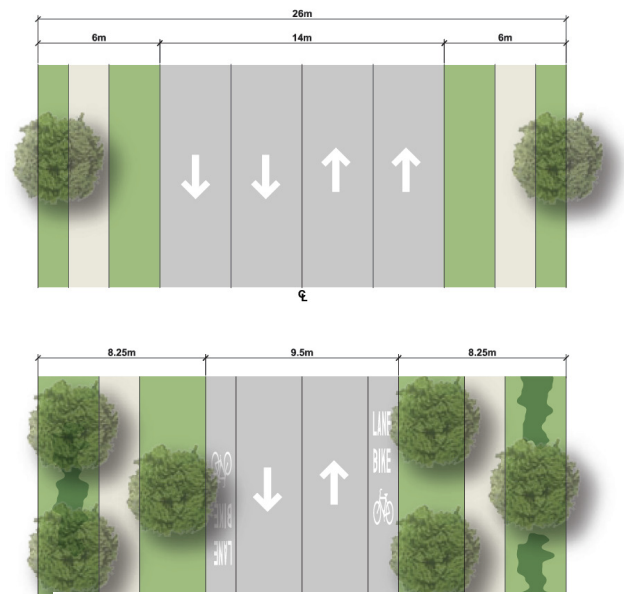


Figure 14: Road Diets Often Favour Active Transportation

transportation modes. This is an example of how to support walking and cycling without the need for right-of-way widenings.

8.3 Cross-Section Demonstrations - Conclusion

Both the *Regional Road Corridor Design Guidelines* and the *Road Corridor Planning and Design Guidelines* provide a series of demonstration cross-sections. These demonstrations correspond to the nine (9) road types introduced on Table 1 of this document.

A sample of Ottawa’s road cross-section demonstrations is provided on this page and on the page that follows. These are just a few of those provided in the City’s Design Guidelines which can be found at <http://www.ottawa.ca>.

The designs serve to illustrate various choices that are available to support active transportation along major urban roads in Ottawa and elsewhere ... how the road corridor components can all come together to form good public spaces, to provide appropriate property access, to sufficiently accommodate services and utilities, and to safely and comfortably support all transportation modes. Active transportation patterns can result.

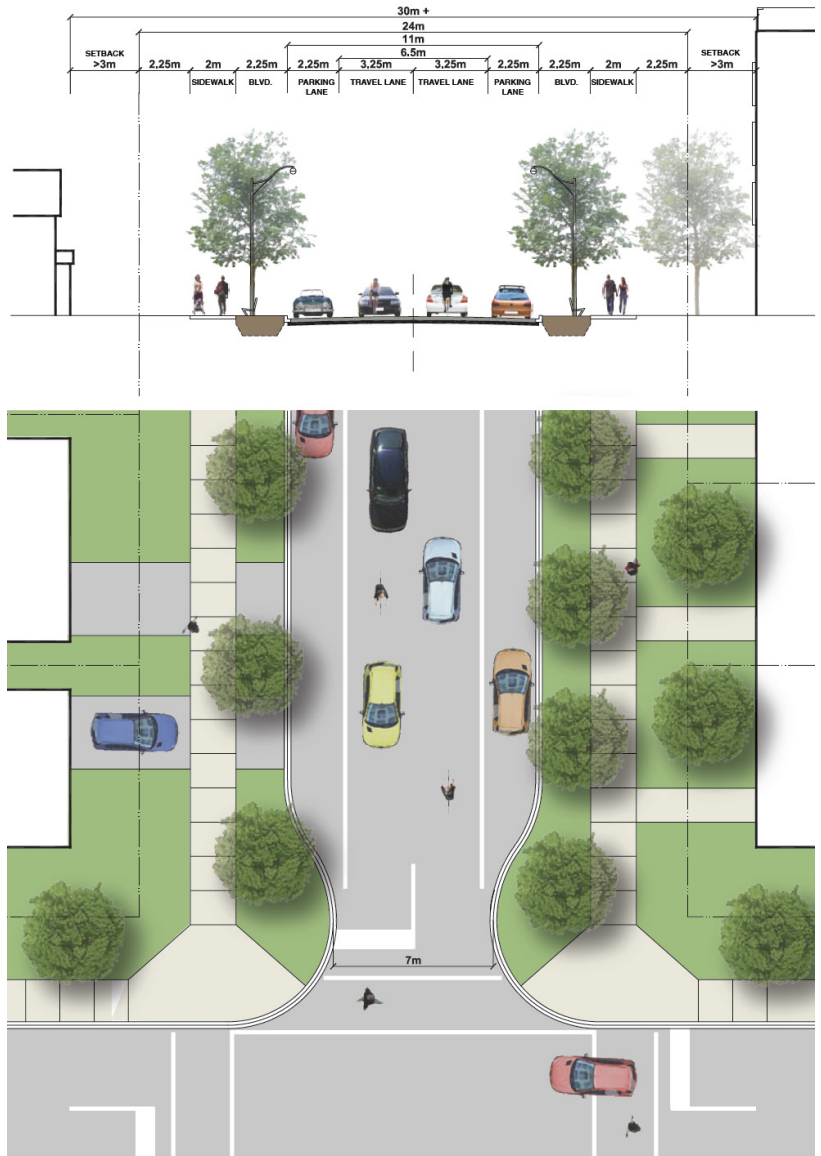


Figure 15: A Reduced (24m) Right-of-Way Can Still Accommodate Road Requirements For this Residential Collector Road

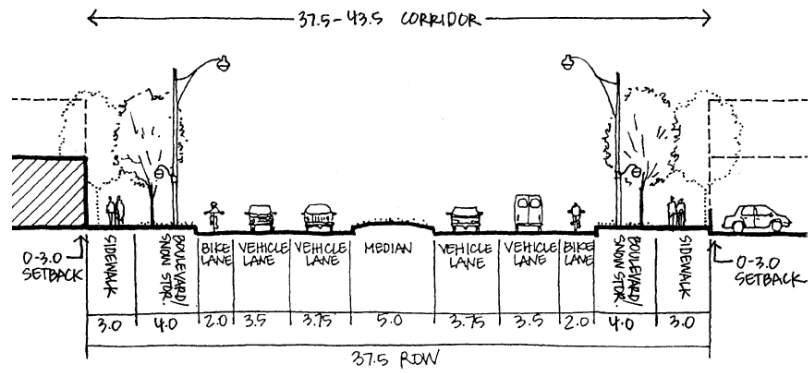


Figure 16: Wider Roads Can Still Promote Active Transportation Within this Commercial Arterial Corridor

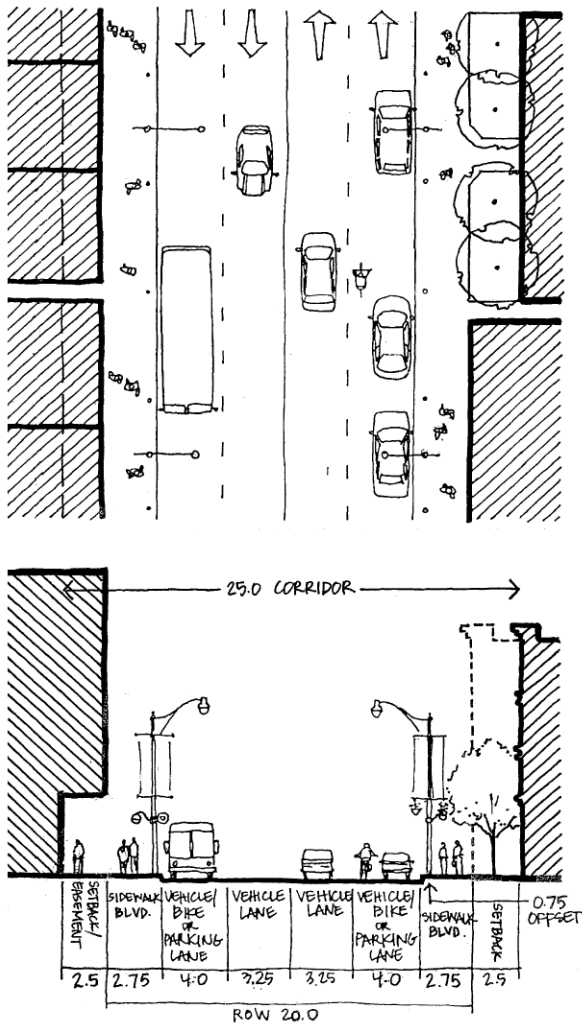


Figure 17: Roads corridors with highly constrained right-of-ways may need to be planned with buildings set back to increase the pedestrian zone.

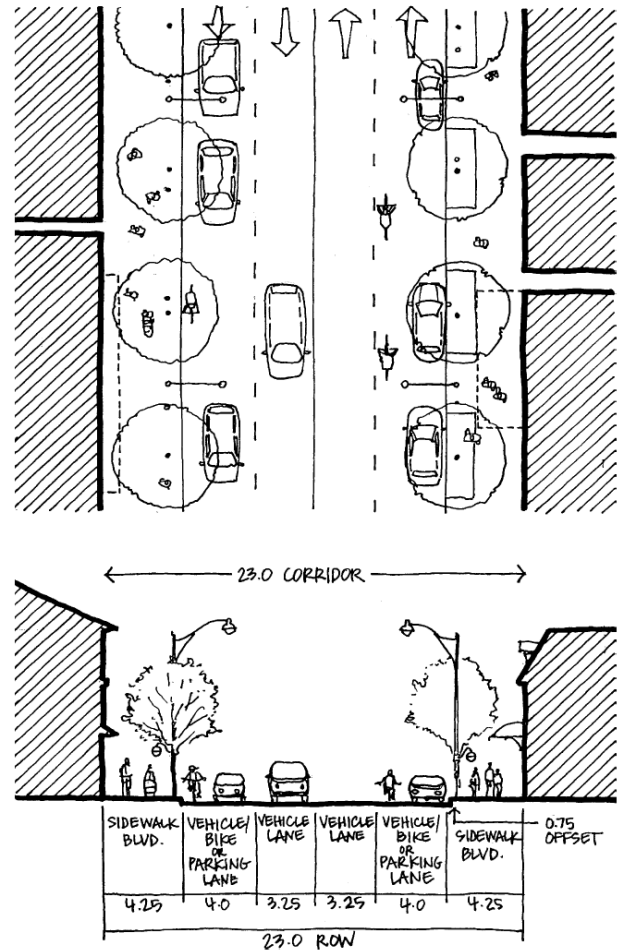


Figure 18: Ottawa's Traditional Mainstreets in a 23.0m right-of-way are highly favourable to Active Transportation.

FIGURES

Figures 1, 4, 5, 6, 8, 11, 12, 16, 17, and 18 are sourced to: Regional Municipality of Ottawa-Carleton, *Arterial Road Corridor Design Guidelines*. Prepared by Delcan Corporation and The Planning Partnership, 2000.

Figures 2, 3, 7, 9, 10, 13, 14, and 15 are sourced to: City of Ottawa, *Road Corridor Planning and Design Guidelines*. Prepared by Delcan Corporation and the Planning Partnership, 2008.

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