

Urban Roadway Classification

Before the Design Begins

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ABSTRACT

Road classification systems are the basis for defining function and, in turn, the design criteria for the world's street networks. The traditional classification systems have been based on the mobility and access functions of roads for motor vehicle traffic. Other road users and road uses have been largely ignored in this important step of the road design process. This article describes alternative classification systems developed by the American Association of Architects, the Province of Ontario, Metro Portland, and the Region of Hamilton-Wentworth.

INTRODUCTION

Roadway design practices are inextricably linked to the purpose of the road as defined by the functional classification system. However, the traditional functional classification system (1, 2) considers the road to be strictly a transportation corridor for motorized vehicles. Streets and roads, particularly in an urban area, are multi-modal transportation corridors and serve more functions than that of mobility and access. Streets are public places: places to gather, socialize, window shop, people watch, etc. An alternative classification system for urban and downtown streets is necessary to better integrate the road, and its design, into the urban fabric. Alternative classification systems that take into account the variety of functions and users of the road allowance have been developed.

This paper outlines the shortcomings of the traditional classification system and describes alternative classification systems developed by the American Institute of Architects, the Province of Ontario, Metro Portland and the Region of Hamilton-Wentworth.

THE TRADITIONAL FUNCTIONAL CLASSIFICATION SYSTEM

The traditional functional classification system (FCS) has become the predominant method of transportation professionals for grouping roads. It was originally developed by transportation planners as a method of communicating the road's character of service. In its most basic form the FCS articulates information about the roads setting (i.e., urban or rural) and the extent to which it provides access to adjacent land and travel mobility.

TABLE 1 The Traditional Functional Classification System

Classification	Location	Characteristics
Principal Arterial	Rural	Trip lengths for statewide or interstate travel. Integrated movement generally without stub connections. Accommodates movement between (virtually) all urban areas with pop. 50,000. Two design types: freeways and other principal arterials.
	Urban	Serves major centers of activity with the highest traffic volumes and longest trip lengths. Integrated internally and between major rural connections. Service to abutting lands is subordinate to travel service to major traffic movements. Design types are interstate, other freeways and other principal arterials.
Minor Arterial	Rural	Links cities, large towns and other traffic generators attracting traffic over long distances. Integrated interstate and intercounty service. Designs should be expected to provide for relatively high speeds and minimum interference to through movements.
	Urban	Trips of moderate length at a lower level of mobility than principal arterials. Some emphasis on land access. May carry local bus routes and provide intracommunity continuity but does not penetrate neighbourhoods.
Collector	Rural	Serve intracounty travel with travel distances shorter than on arterial system. More moderate speeds. Divided into major and minor system.
	Urban	Provides both land access and traffic circulation within all areas. Penetrates neighbourhoods and communities collecting and distributing traffic between neighbourhoods and the arterial streets.
Local	Rural	Local roads primarily provide access to adjacent land and the collector network. Travel is over short distances.
	Urban	Primarily permits direct land access and connections to the higher order streets. Lowest level of mobility. Through traffic is usually deliberately discouraged.

The complete functional classification system has been developed around the hierarchy of movements: main movement, transition, distribution, collection, access and termination. It is shown in Table 1.

The two main shortcomings of the FCS in an urban environment are that it does not consider other modes of transportation and does not consider roadway functions outside of access and mobility. For the remainder of this paper, other modes will be considered as “road users” and other functions as “road uses.”

With respect to the lack of consideration of other road users, it is arguable that the hierarchy of movements on which the FCS is based is equally applicable to walking, cycling, public transit and the private motor vehicle. However, the facilities that would serve “main movement” for a motor vehicle are significantly different than the facilities serving the “main movement” for pedestrians. Generally speaking, the movement of motor vehicle traffic requires a smooth, direct and uninterrupted route and little in the way of amenities. In fact, clear zones at the side of the road are preferable for safety and convenience. The movement of pedestrian traffic is influenced much more by “comfort.” In order to create a “main movement” facility for the pedestrian, smooth, direct and uninterrupted routes are still desirable, but the provision of substantial roadside amenities (e.g., benches and trees) is also desirable.

Access and movement are the two functions served by streets under the FCS. In urban environments, these are but two of many uses of the roadway. The reality is that some roadways are used for purposes such as socializing, window-shopping, people-

watching, road hockey and stick ball. Transportation professionals need to be cognizant of these other road uses and, where appropriate, incorporate design features into the roadway that will make the movement of motor vehicles (no matter what stage of the trip) compatible with these uses. The consideration of other road uses, which potentially leads to some redesign to ensure compatibility between movement and other uses is required.

In an effort to overcome the above-mentioned shortcomings of the traditional FCS, several agencies and groups have decided that the change in thinking has to be systemic. It is not acceptable to simply widen a sidewalk or provide a bicycle lane in isolated instances during the design phase. This lack of planning would not be acceptable for the motor vehicle network. Furthermore, cyclists and pedestrians are vulnerable road users and require more than the basic capacity and safety considerations traditionally given to motor vehicle traffic.

In order for the thinking to change it is important that the foundations of the thinking change. Alternative classification systems that acknowledge the different users and uses of the road allowance are necessary to establish a new foundation of knowledge. Four alternative systems are described in the following sections.

AMERICAN INSTITUTE OF ARCHITECTS (AIA)

Similar to the traditional functional classification system, the AIA's system sees streets (or corridors) as serving one of two purposes. Unlike the traditional system the purposes are not access and mobility, they are connection and division. In other words, streets and corridors either connect neighbours and communities or they serve to separate them. This view of how the street network impacts on the community is the basis for the AIA's alternative classification system.

The AIA system for classifying streets is based on "capacity and character." Capacity, as most transportation professionals are well versed, is a measure of how well the particular street moves people. For motor vehicle travel it is based on the number and width of lanes, grades, intersection control, and various other factors. Character refers to a street's "suitability for pedestrian activities and a variety of building types" (3). Street character is reflected in the associated buildings, frontages and landscape types, and sidewalk width and amenities.

The AIA has proposed a system with 10 classes that reflect differing degrees of suitability for traffic movement, pedestrian activity and building types. This system is applicable to all streets within a city or town. The proposed system is shown in Table 2.

It is evident from the descriptions provided that the AIA is more concerned with how the road impacts on the community and fits in with adjacent land uses than the traditional classification system.

THE PROVINCE OF ONTARIO

The Province of Ontario, through the Ministries of Housing and Municipal Affairs, undertook a study in 1993–94 to produce Alternative Development Standards for residential subdivisions (4).

The study was a response to increasing pressure by cities, towns and developers to permit more compact and innovative community designs. The report that was produced

TABLE 2 AIA Street Classification System (3)

Classification	Description
Highway	A long-distance, medium speed vehicular corridor that traverses open country. A highway should be relatively free of intersections, driveways and adjacent buildings; otherwise it becomes a strip, which interferes with traffic flow.
Boulevard	A long-distance, medium speed vehicular corridor that traverses an urbanized area. It is usually lined by parallel parking, wide sidewalks, or side medians planted with trees. Buildings uniformly line the edges.
Avenue	A short-distance, medium speed connector that traverses an urban area. Unlike a boulevard, its axis is terminated by a civic building or monument. An avenue may be conceived as an extremely elongated square.
Drive	An edge between an urban and a natural corridor, usually along a waterfront, park or promontory. One side of the drive has the urban character of a boulevard, with sidewalk and buildings, while the other has the qualities of a parkway, with naturalistic planting and rural detailing.
Street	A small-scale, low speed connector. Streets provide frontage for higher-density buildings such as offices, shops, apartment buildings, and rowhouses. A street is urban in character, with raised curbs, closed drainage, wide sidewalks, parallel parking, trees in individual planting areas, and buildings aligned on short setbacks.
Road	A small-scale, low speed connector. Roads provide frontage for low-density buildings such as houses. A road tends to be rural in character with open curbs, optional parking, continuous planting, narrow sidewalks, and buildings well set back. The rural road has no curbs and is lined with pathways, irregular tree planting and uncoordinated building setbacks.
Alley	A narrow access route servicing the rear of buildings on a street. Alleys have no sidewalks, landscaping, or building setbacks. Alleys are used by trucks and must accommodate dumpsters. Alleys are usually paved to their edges, with center drainage via an inverted crown.
Lane	A narrow access route behind houses on a road. Lanes are rural in character, with a narrow strip of paving at the center or no paving. While lanes may not be necessary with front loading garages, they are still useful for accommodating utility runs, enhancing the privacy of rear yards, and providing play areas for children.
Passage	A very narrow, pedestrian-only connector cutting between buildings. Passages provide shortcuts through long blocks or connect rear parking areas with street frontages. Passages may be roofed over and lined by shop fronts.
Path	A very narrow pedestrian and bicycle connector traversing a park or the open country. Paths should emerge from the sidewalk network. Bicycle paths are necessary along highways but are not required to supplement boulevards, streets, and roads, where slower traffic allows sharing of the vehicular lanes.

from this study presented a range of alternative standards that could be used as a guide by municipalities in developing new communities.

Included in the report is a new street hierarchy for urban and suburban development that replaces the traditional local street with 6 new classifications. Each class of street demonstrates a clearer connection between the land use and the multi-purpose role of the street. This wider range of street types permits designs that are more responsive to local conditions and community values, and are more environmentally sustainable.

The need for a differentiation of streets based upon a broader set of considerations (rather than solely on vehicular movement) has resulted in the classification system shown in Table 3 replacing the local street category.

TABLE 3 Province of Ontario Classification System (4)

Classification	General Description
Mews	A small-scale street whose primary function is to provide access to the front of individual dwellings rather than to serve through traffic. There is minimal traffic and full opportunities for play.
Minor Street	A small-scale, generally short internal local street serving a local neighbourhood. Still some opportunities for play on the street.
Street	A medium-scale local street inter-linked to the neighbourhood network.
Traditional/Major Street	A locally oriented street that may play a more important role than the minor urban street. May be a perimeter road providing access to streets within the neighbourhood.
Main Street	A local centre street, usually short, with strong pedestrian orientation, accessible to the surrounding neighbourhood, containing a mix of uses (stores, community facilities, apartments, etc.).
Grand Boulevard	A wider-scale street that could accommodate denser development and mixed uses, with generous sidewalks and other features such as a landscaped median. Serves as the public focus of a neighbourhood centre.

The limitation with this system is that it only replaces the local street category in the traditional FCS. Further work is needed to integrate the collector and arterial categories within this new framework.

METRO PORTLAND

Metro Portland has a five-category system that reflects the various roles of the street within a regional context. Metro deals mainly with roads that are intended to provide mobility and connectivity between urban centers and traffic generators. Therefore, this classification system focuses on the mobility-type streets. The Metro system is more complete than the traditional system due to consideration of multi-modal travel and integration of land use. It is shown in Table 4.

TABLE 4 Metro Portland's Street Classification System (5)

Classification	General Description
Throughways	Emphasizes motor vehicle travel and connects major activity centres
Boulevards	Serves major centres of urban activity and emphasizes public transportation, bicycle and pedestrian travel while balancing the many travel demands of intensely developed areas.
Streets	Serve transit corridors, main streets and neighbourhoods with designs that integrate many modes of travel and provide easy pedestrian, bicycle and public transportation travel.
Roads	Traffic oriented facilities with designs that integrate all modes but primarily serve motor vehicles.
Local Streets	Streets that complement the regional system by serving neighbourhoods and carrying local traffic.

TABLE 5 Portland's System Compared to the Traditional System (5)

		Traditional Functional Classification System				
		Principal Arterial	Major Arterial	Minor Arterial	Collector	Local Street
Design Classification System	Throughway	■				
	Boulevard		■	■		
	Street		■	■		
	Road	■	■	■		
	Local Street				■	■

A comparison of the Portland design classification system to the traditional FCS is provided in Table 5.

REGION OF HAMILTON-WENTWORTH (RHW)

The Region of Hamilton-Wentworth's alternative classification system was developed for the downtown streets in the City of Hamilton. Streets are classified in one of five categories. Each category articulates the expected users of the road allowance, their relative priority for movement, the typical contiguous land uses, the acceptable speed for motor vehicles, and the usual elements of the cross-section.

As part of a revitalization effort in downtown Hamilton, the RHW undertook a downtown transportation study to develop a transportation plan that would be supportive of desired land uses and economic initiatives. One of the early components of the study was to develop a new street classification system that would explicitly recognize that the street is a public space performing many functions and serving many users. The majority of downtown critics apportioned some blame for the downtown's decline to the transportation engineers, who turned the urban core into a thoroughfare instead of a destination. This new classification system demonstrated to the public and stakeholders that the transportation engineers were embracing a new way of thinking about street functions.

In the case of Hamilton-Wentworth, the Region had knowledge of the alternative systems presented previously, and made use of these efforts in developing their own system. The resulting system is shown in Table 6.

SUMMARY

Alternative classification systems are an important first step in reworking the urban transportation system to provide a street network that recognizes and accommodates the varying uses of the road allowance and fully integrates all road users. If roadway design practices are going to change, it is imperative that transportation professionals begin to understand the different functions of the road before the design process begins.

TABLE 6 Region of Hamilton-Wentworth Classification System (6)

Classification	Primary Uses	Road Users	Speed (Vehicular)	Flow Characteristics	Adjacent Land Uses	Typical Elements
Passage	Walking Socializing Gathering Shopping	Pedestrians Cyclists	N/A	Pedestrian Priority	High density residential, retail/commercial, mixed use	Sidewalk and pedestrian amenities
Traditional Street	Walking, Cycling, Socializing, Access to properties, Parking and loading	Pedestrians Cyclists Buses Cars (local) Trucks (deliveries only)	< 30 km/h	Pedestrian flow is the primary consideration. Vehicle flow is interrupted.	High density residential, retail/commercial, office, mixed use	Sidewalks on both sides of the street, 2 lanes of travel, parking lanes
Main Street	Walking, Cycling Access to properties, Socializing, Parking and loading, Circulation	Pedestrians Cyclists Buses Cars (local) Trucks (deliveries only)	30 to 40 km/h	Traffic calmed	High density residential, office, retail, mixed use, civic space	Two wide sidewalks, 2 lanes of travel (maximum), parking lanes
Gateway	Access to properties Socializing Parking and loading, Walking Cycling Circulation	Pedestrians, cyclists Buses Cars (local) Trucks (deliveries)	30 to 50 km/h	Traffic calmed. Pedestrians and vehicles are given roughly equal consideration.	Mixed use Civic space	Two wide sidewalks with many pedestrian amenities, provisions for cyclists, 2 to 4 lanes of travel, boulevards and/or a landscaped median, parking lanes, transit amenities.
Mobility Street	Walking Cycling Freight movement Travel circulation	Pedestrians, cyclists Buses Cars (through) Trucks (through)	50 to 60 km/h	Uninterrupted vehicular flow. Pedestrian flow is interrupted at points of conflict. Transit may be given priority.	Commercial, office	One or two sidewalks with boulevards, provisions for cyclists, 4 to 6 lanes of travel, possibly exclusive transit lanes.

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