District of North Vancouver

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Roadway Classification Review

District of North Vancouver

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1. INTRODUCTION

1.1 Background

The current roadway classification system is based on the "North Vancouver Transportation Network Study" prepared in 1990. The study examined the overall function of the transportation system on the North Shore and identified options to meet the travel demands in 2011.

In the study four roadway classes were recognized: major arterial, minor arterial, collector, and local roads. The system has been used in making planning and engineering decisions for over 20 years, and it is now necessary to update it to reflect the changes undergone and anticipated.

1.2 Purpose

The purpose of this report is to review the current roadway classification system, and to provide recommendations how the system can be amended to better reflect existing conditions and meet future goals.

1.3 Methods Used

The general methods and procedures in updating the road classification system are summarized here.

- Collected existing data on traffic volumes and looked at road widths and sidewalks in the GIS system.
- Estimated future traffic volumes based on growth outlined in the OCP, the 2011 Road Network Study, and expected major developments.
- Compared the District's existing practice with those outlined in the Transportation Association of Canada guidelines.
- Identified strengths and weaknesses in the current system.
- Developed four (4) different classification system options for addressing identified issues as well as meeting anticipated growth in the OCP.
- Developed evaluation criteria to compare alternative approaches.
- Selected the approach which scored the highest overall to be the new classification system.

- Developed recommended roadway classification guidelines which were based on Transportation Association of Canada guidelines and the District's Development Servicing Bylaw No. 7388.

- Applied recommended guidelines and identified road sections that displayed inconsistencies with the guidelines.

- Proposed new classes for road sections based on their expected traffic volumes, physical conditions, and potential service implications.

- Proposed an amendment to the Development Servicing Bylaw for approval by the District Council.

A consultation process also took place. A staff group was formed with representatives from multiple departments in the District of North Vancouver including Transportation, Engineering Design, Streets, Development Planning, and Policy Planning. External agencies including the Transportation Planning Advisory Committee / Transportation Consultation Committee have also been involved through regular meetings with the District.

The Transportation Department of the City of North Vancouver was also involved in this consultation process. Information from the District's GIS Department was used in the maps and analyses featured in this report.

1.4 Process for Approval

The District's policy on road classification is currently described in the Development Servicing Bylaw No. 7388 (2005) which includes a "Highway Classification Map" and Road Classification Table. The Development Servicing Bylaw regulates development decisions based on road classification such as driveway locations, curb return radii for intersecting roads, lane width, and sidewalk requirements.

The map in the Development Servicing Bylaw does not appear to be actively referenced nor does it reflect current practice. Changes to the policy and map referenced in this bylaw require the approval of the District Council.

In February 2013, District staff will bring forward the proposed changes to Council with an amendment to the Development Servicing Bylaw. Subject to approval the "Highway Classification Map" will be replaced with a new map with the proposed changes listed in Appendix C.

2. Existing Roadway Classification System

A roadway classification system is used to make long-term planning decisions. It may also be used to help outline the design requirements of each roadway class. A properly classified road system does not only help define snow removal and sidewalk priorities but also regulates access improvements for all subdivisions and developments. This chapter discusses the different characteristics and functions of the four existing road classes in the District of North Vancouver, although the same feature may be shared by more than one roadway class.

The current roadway classification system for the District of North Vancouver is based on the "North Vancouver Transportation Network Study" prepared in 1990. The system provides roadway standards for right-of-way and curb to curb widths for each of the four roadway classes.

- **Major Arterial Roads.** The primary function of this road class is to support traffic movement of all vehicle types. Parking is usually restricted during peak hours or prohibited throughout the day. In most cases it is prohibited by the Development Servicing Bylaw for single family residential driveways accessing directly onto major arterial roads. Sidewalks are to be provided on both sides of the road for pedestrian safety. Traffic demand is typically between 8,000 and 50,000 vehicles per day in both directions.

  Some examples of major arterial roads include Marine Drive, Capilano Road, and Mount Seymour Parkway (Exhibit 1). Regional roads designated by TransLink as Major Road Network (MRN) are typically in this class.

Exhibit 1: Mount Seymour Parkway, with raised centre median

- **Minor Arterial Roads.** Similar to major arterial roads, the function of minor arterial roads also focuses on traffic movement. With average traffic demand in the range of 3,000 to 10,000 vehicles per day in both directions, access to adjacent residential development on minor arterial roads is also possible. Parking on one or both sides can also be accommodated where there is sufficient roadway width. Examples of existing minor arterial roads include Delbrook Avenue, Highland Boulevard, and Montroyal Boulevard. Ross Road, currently a minor arterial road, is shown in Exhibit 2.

Exhibit 2: Dempsey Road, East of Mountain Highway

- **Collector Roads.** This road class equally supports both movement and access. It carries traffic volume between 1,000 and 8,000 vehicles per day in both directions. Depending on the width of the road, a collector road in the District usually provides for two travel lanes, and parking can be made available on one or both sides. Examples of collector roads include Fromme Road, Garden Avenue, and West 15th Street (Exhibit 3).

Exhibit 3: West 15th Street

- **Local Roads.** The primary focus of this road class is land access rather than traffic movement. Parking is usually available on both sides of the road except for a few local conditions. The volume is generally lower than 1,500 vehicles per day in both directions. Some local roads do not have a sidewalk on either side. Driveway access onto local roads is preferred over any other classes if opened public lanes are not available. Examples of local roads include Regent Avenue, Beachview Drive (Exhibit 4), and Anne MacDonald Way.

Exhibit 4: Beachview Drive

Some key features of the current road classes are summarized in Table 2.1 on the next page.

Table 2.1: District of North Vancouver Characteristics of Urban Roads

	LOCAL ROADS	COLLECTOR ROADS	MINOR ARTERIAL ROADS	MAJOR ARTERIAL ROADS
TRAFFIC SERVICE FUNCTION	Traffic movement is the secondary consideration.	Traffic movement and land access are of equal importance.	Traffic movement is the primary consideration.	Traffic movement is the primary consideration.
LAND ACCESS FUNCTION	Land access is the primary consideration.		Land access is a secondary consideration.	Limited, restricted or prohibited access.
ROAD WIDTH	Usually 8.0 m	Usually 11.5 m, wider desirable for transit routes.	Usually 11.5 m, wider desirable for transit routes.	11.5 m or more
NUMBER OF MOVING LANES	Usually one shared by vehicles on an alternating directional basis.	Usually two with additional lanes at some main intersections as necessary.	Usually two with additional lanes at some main intersections as necessary.	Usually three or more with additional lanes for turning movements at intersections.
PARKING	Usually both sides but may be only on one side if local problems exist.	On one or both sides as is necessary or feasible.	On one or both sides as is necessary or feasible.	Limited and quite often restricted and/or prohibited.
TWO-WAY TRAFFIC VOLUME, VEHICLES PER DAY	< 1,500	1,000 - 8,000	3,000 - 10,000	8,000 – 50,000
TWO-WAY TRAFFIC VOLUME FROM T.A.C., VEHICLES PER DAY	< 3,000	1,000 - 12,000	5,000 and more	Up to 30,000

3. CLASSIFICATION SYSTEM OPTIONS

It is necessary to review and update the current classification system to reflect existing road conditions and prepare for anticipated traffic volume changes in the District.

The following outlines several options of possible amendments to the system:

- **Keep the current classification system with minor modifications.**
- **Combine minor arterial and collector classes.**
- **Combine major and minor arterial classes.**
- **Re-define by role and land use.**

Each of these options will be discussed and compared in the following sections.

3.1. Option 1: Keep the Current Classification System with Minor Modifications

The current roadway classification system has been adopted and used for over 20 years. There are benefits in keeping the current system to meet expectations of road users. However, some concerns need to be addressed in the improved system.

In the current system the expected traffic volumes for both collector and minor arterial roads are somewhat similar (Table 2.1). Also, Indian River Drive, for example, is an uncurbed road that would require special considerations for pavement rehabilitation and snow removal. As a result, it is proposed that the current road classification system to be kept with the following changes:

- Change the two-way traffic volume range for minor arterial roads to be between 5,000 and 20,000 vehicles per day (existing range is between 3,000 and 10,000) to better align with Transportation Association of Canada guidelines.
- Create a new Rural road class for its unique operational and physical characteristics.

3.2. Option 2: Combine Minor Arterial and Collector Classes

In this option, the minor arterial and collector roads would be combined to form a single roadway class, which should display the characteristics of both classes. In other words, the new roadway class should place traffic movement and land access of similar importance.

This arrangement would consolidate four classes down to three (i.e. arterial roads, collector roads, and local roads). Since the range of traffic volumes on most minor arterial roads (3,000 – 10,000 vehicles per day) overlaps with that of collector roads (1,000 – 8,000 vehicles per day) in the District, it may be feasible and practical to combine the two road classes (1,000 – 10,000 vehicles per day). The new roadway class may be considered for traffic calming, as most of the roads function as collector roads in the existing system.

3.3. Option 3: Combine Major and Minor Arterial Classes

Similar to Option 2, this option also consolidates the current classification system into three major classes (i.e. arterial roads, collector roads, and local roads). The minor arterial class would be combined with the major arterial class.

The major consideration for this option would be that minor arterial roads do not typically carry volumes (3,000 – 10,000 vehicles per day) comparable to those on major arterial roads (8,000 – 50,000 vehicles per day). Also, arterial roads should be access-controlled according to the Development Servicing Bylaw. Since most minor arterial roads, such as Highland Boulevard and Delbrook Avenue, currently provide accesses to adjacent land use, this option may not be practical.

3.4. Option 4: Re-define by Role and Land Use

In this option, new classes would be created based on the surrounding land use. For example, instead of being classified by their function (collector or arterial), roads could be defined as residential, industrial, or commercial. The benefit of this approach would be that road could be better configured to serve its expected use. For example, commercial roads may attract more parking and would be configured accordingly. Similarly, industrial roads would allow for more truck traffic.

Creation of a ‘rural’ road classification was also considered in this option. This would clearly recognize that roads in the alpine area have a different purpose and need a different approach than more urban roadways. For example, Indian River Drive east of Indian River Crescent would be a candidate for a rural road, which has no curbs but gravel shoulders and open ditches. The road carries approximately 1,200 vehicles per day and primarily provides land access to adjacent properties.

If classes are not defined by land use, design features can still be developed that recognize the role and land use. This is currently accomplished in the Development Servicing Bylaw, where road cross-sections can vary by land use. However, this would be done outside of the road classification process.

3.5. System Evaluation

Table 3.1 provides a summary of the above discussions. A rating score is given to each option based on five main categories: Simplicity in implementation, cost effectiveness, appropriate road geometry, anticipated safety improvements, and accommodation of alternate modes. The overall score of each option is then calculated and compared to determine the recommended roadway classification system. Each category is defined below.

- **Simplicity in implementation:** If the new system is much different from the existing one, it would require extra time and staff resources to complete the changes and, therefore, would score lower in this category. On the other hand, if the system stays the same with minimum changes, it would receive a higher score.

- **Cost effectiveness:** This category estimates the total costs from the planning stage to the final implementation stage of applying an updated roadway classification system. It may also include the anticipated engineering design and construction costs of new or revised roads suggested in the new system. For example, if a minor arterial road with only one sidewalk is to be changed into a major arterial road with two sidewalks and all driveway accesses relocated to a back lane, the expected cost would be higher and therefore such a system would score lower in this category.

- **Appropriate road geometry:** This describes how well the current road geometry is consistent with the standards in the Development Servicing Bylaw. It looks at road right-of-way, pavement right-of-way, and number and width of sidewalk required. For instance, the Bylaw requires a 1.5-m sidewalk on both sides of a residential collector road. However, it is uncommon to see a residential collector road to have two sidewalks. It implies that construction upgrades may be required for roads that have not met the standards. Alternatively, the standards may need to be changed to reflect the appropriate road conditions. A higher score in this category represents a better compliance with the Bylaw.

- **Anticipated safety improvements:** A road network with proper distribution of roadway classes will accommodate drivers' expectations and enhance the safety of roadway users by reducing the likelihood of collisions. An ideal intersection would be of roads with adjacent roadway classes. For example, an arterial road would be better to connect with a collector road. This provides a gradual transition of traffic flow and ensures efficiency in the traffic network. A connection between an arterial road and a local road should be avoided. A higher score is therefore given to a system which has roadway classes that better reflect this concept.

- **Accommodation of Alternate Modes:** Alternate transportation modes have become more popular in the network. The needs of transit users, cyclists, and pedestrians should be taken into consideration when designing new roads. The roadway classification should be suitable for existing as well as future needs, and be able to accommodate multiple transportation modes. A higher score is given to a system which is more likely to accommodate different transportation modes.

Table 3.1: Summary of Rating Scores for Each Reclassification Option

Criteria	**Option 1** **Keep Current System with Minor Modifications**	**Option 2** **Combine Minor Arterial and Collector Classes**	**Option 3** **Combine Major and Minor Arterial Classes**	**Option 4** **Re-define by Role and Land Use**
Simplicity in Implementation*	3	2	2	1
Cost Effectiveness*	3	2	1	1
Appropriate Road Geometry*	2	2	1	3
Anticipated Safety Improvements*	2	2	1	3
Accommodation of Alternate Modes*	2	2	2	3
Overall Score (out of 15)	**12**	**10**	**7**	**11**

** A sub-score from 1 (low) to 3 (high) is assigned to a system option for each of the five evaluation categories. For example, option 1 is easier to implement than option 4, and therefore scores higher in the "Simplicity In Implementation" category. An overall score for each option is then obtained by adding up all the sub-scores.*

As a result, Option 1 has the highest overall score and so it is recommended that the existing District classification system consisting of four roadway classes be kept.

4. Application of Recommended Classification System

4.1. Application of Recommended Guidelines

From the comparison of options shown in Chapter 3, it is recommended that the District generally retains the existing roadway classification system which has major and minor arterial roads, collector roads, and local roads, while adding a rural classification. It was also decided that the volume range of the minor arterial class be revised to be between 5,000 and 20,000 vehicles per day). This revised range would help distinguish the minor arterial roads from the collector roads which typically carry 1,000 to 8,000 vehicles per day.

4.2. Recommended Classification Guidelines

Table 4.1 summarizes the features of the proposed roadway system. There are exceptions where a road may display characteristics of more than one road class, and the table should be used as a reference only. A list of roadway features is described in Appendix B.

Table 4.1: Recommended Roadway Classification Guidelines for the District of North Vancouver

Features	Local	Collector	Minor Arterial	Major Arterial	Rural
Traffic service function	land access more important than traffic movement	traffic movement and land access of equal importance	traffic movement more important than land access	traffic movement major consideration	land access and traffic movement
Expected traffic volume (daily vehicles)	<1,500	1,000-8,000	5,000-20,000	10,000-50,000	<2,000
Speed limit (km/h)	30 - 50	30 - 50	50 - 60	50 – 60	30 - 50
Vehicle type	passenger and service vehicles	passenger and service vehicles	all types	all types	passenger and service vehicles
Desirable connections	lanes, locals, collectors	locals, collectors, major and minor arterials	collectors, major and minor arterials	collectors, major and minor arterials, Highway	lanes, locals, collectors, minor arterials
Transit service	generally avoided	permitted	permitted	permitted	avoided
Bicycle access	no restrictions	no restrictions	separate facilities desirable	separate facilities	no restrictions
Pedestrian access	sidewalks on one side desirable	sidewalks on both sides desirable	sidewalks on both sides desirable	sidewalks on both sides required	no restrictions
Pavement width (m)	8.0 - 11.2	15.2 - 16.2	16.0 - 22.3	16.0 - 22.3	8.0 - 11.2
Number of travel lanes	2	2 to 4	2 to 4	2 to 4	Up to 2
Number of parking lanes	1	Varies	Varies	Varies	None
Recommended width of travel lane (m)	3.0 - 4.3	3.3 - 4.3	3.7 - 4.3	3.7 - 4.3	3.0 - 3.7, shoulder desirable
Driveway Access	preferred over collectors if lanes are not available	limited	limited	not permitted	limited

Four classes are primarily designated for urban roads and features are provided in the Development Servicing Bylaw. For rural roads, the *TAC Geometric Design Guide for Canadian Roads* shows desirable design characteristics. The District has also adopted a customised road section for alternative local and collector roads with no curbs in the Development Servicing Bylaw No. 7388.

4.3. Network Assessment

The roadway classification guidelines in Table 4.1 have been customised to reflect characteristics of the District's road network, based on the *Geometric Design Guide for Canadian Roads* (TAC). One of the more noticeable differences would be the volume component of the table. In the TAC guidelines, a major arterial road may carry up to 30,000 vehicles per day. Marine Drive, which is classified as a major arterial in the District, carries about 40,000 vehicles per day. A revised volume definition is therefore required to reflect characteristics of the District.

In fact, traffic volumes are crucial in determining the roadway classification in the network. In the analysis, the proposed classification of a roadway is adjusted primarily to its traffic volume, although other factors influence and are described below.

In applying the updated classification system, thirty (30) road sections are going to be reclassified (19 downgrades, 9 upgrades, and 2 rural). A list of roads where a change is proposed to the classification is attached in Appendix C. The maps with the recommended roadway changes are attached in Appendix A.

4.3.1. Traffic Volumes

With the District's new vision for growth outlined in the OCP, some roads in the upper areas of the District are not ever going to carry as much traffic as once envisioned and some roads in growing areas will play a greater role. Over time as decisions are made, assigning the appropriate classification will help to create consistency among roads of similar functions, reduce liability, and improve safety.

Traffic volume of a roadway is usually the deciding factor for its classification. Some roads have been reclassified because their actual traffic volumes are not as high as anticipated when they were designed. Dempsey Road, for example, was originally designed to connect with a north extension of Lillooet Road for possible development opportunities on the east side of Lynn Creek. Since these developments are not likely going to occur in the foreseeable future, Dempsey Road is not likely to be extended and the current road could be considered overbuilt with less than 2,500 vehicles per day. For this reason, it is proposed that Dempsey Road be reclassified from a minor arterial road to a collector road.

4.3.2. Pavement Width

Another factor that affects the class of a roadway is its pavement width, which determines how many travel and parking lanes can be accommodated. The design standards in the Development Servicing Bylaw illustrate the typical pavement and lane widths for each road class. However, the standards are intended for new roads with

possible considerations for shared or designated bike lanes, and therefore should only serve as a guideline in determining the classification of existing roadways.

For example, Ridgewood Drive between Edgemont Boulevard and Highland Boulevard has only two travel lanes and one sidewalk, and is not a transit route. By definition, the pavement width (7.9 m) is sufficient for a local road. However, the average daily traffic volume of the road is approximately 4,500 vehicles, and it also provides access to the adjacent properties. After taking these into consideration, this section of Ridgewood Drive should be reclassified from a minor arterial road to a collector road.

Ross Road, located east of Mountain Highway, has two travel lanes, two parking lanes, and one sidewalk. Although the overall pavement width (11.6 m) and its typical road section may resemble that of a local road, the amount of traffic generated (3,700 vehicles per day) fits into the collector road category. In addition, Ross Road provides a neighbourhood linkage between Mountain Highway and Hoskins Road, and provides access to its adjacent residential properties at the same time. As a result, Ross Road should be reclassified from a minor arterial road to a collector road to reflect its equally-important dual functions.

4.3.3. Transit Routes

Each road class is designed to handle different vehicle loads. The design road base and pavement requirements are therefore different to accommodate the heavier vehicle loads. A residential local road requires a minimum of 300mm of granular materials and 80 mm of asphalt pavement; whereas, a collector road (residential or commercial) requires a minimum of 400mm of granular materials and 100 mm of asphalt pavement.

The added thickness for a collector road is required to handle the additional vehicle weight and volumes. Therefore, transit routes should be on collector or arterial roads. For example, Purcell Way, which is currently a local road servicing buses from and into the Capilano University, should be reclassified accordingly.

4.3.4. Designated Routes

The District has designated a number of roads for Dangerous Goods Routes and Disaster Response Routes. These routes are preferred to be on major arterial roads to ensure mobility and public safety.

Table 4.2 on the next page shows a condensed version of the recommended roadway classification guidelines in Table 4.1.

Table 4.2: Proposed Roadway Classification Guidelines

Features	Local	Collector	Arterial		Rural
			Minor Arterial	Major Arterial	
Expected traffic volume (daily vehicles)	<1,500	1,000-8,000	5,000-20,000	10,000-50,000	<2,000
Speed limit (km/h)	30 - 50	30 - 50	50 - 60	50 – 60	30 - 50
Vehicle type	passenger and service vehicles	passenger and service vehicles	all types	all types	passenger and service vehicles
Desirable connections	lanes, locals, collectors	locals, collectors, major and minor arterials	collectors, major and minor arterials	collectors, major and minor arterials, Highway	lanes, locals, collectors, minor arterials
Transit service	generally avoided	permitted	permitted	permitted	avoided
Bicycle access	no restrictions	no restrictions	separate facilities desirable	separate facilities	no restrictions
Pedestrian access	sidewalks on one side desirable	sidewalks on both sides desirable	sidewalks on both sides desirable	sidewalks on both sides required	no restrictions
Driveway Access	preferred over collectors if lanes are not available	limited	limited	not permitted	limited

5. SERVICE IMPLICATIONS

The proposed road classification system will likely bring about some service implications in the District. Both road infrastructure planning decisions and engineering operations will be influenced by the proposed system.

- **New sidewalks:** The number of sidewalks on a road is always determined by its classification. It would be desirable to have one sidewalk on a residential local road and two on a collector road. The funding priority for new sidewalks would be reviewed and adjusted accordingly when a roadway is proposed to be changed from collector to local, or vice versa.

- **Pavement rehabilitation:** In general, the classification of a road has a major influence on the frequency of it being re-paved. However, the conditions of the road often determine when and how it is going to be rehabilitated. In other words, a proposed downgrade or upgrade of the road class may not necessarily affect pavement rehabilitation priorities if current traffic volumes and vehicle types remain relatively unchanged.

- **Snow removal:** Arterial roads and bus routes (could be on collector or sometimes local roads) are "Priority One" routes, whereas collector roads or routes to schools are "Priority Two" routes in snow removal priorities. Again, a proposed downgrade or upgrade of the road class may not change current snow removal priorities. A non-transit route that is undergoing a change from local to arterial road will, however, likely have a higher snow removal priority (i.e. Riverside Drive (W)).

- **Access management:** As per the Development Servicing Bylaw No. 7388, residential driveway access to an arterial road is not permitted unless the provision of alternate access is not possible. Both Purcell Way and Riverside Drive (W) are proposed to be upgraded from local to minor arterial. The proposed change could influence access planning decisions in future development opportunities on these two roads. Some road sections, however, will be allowed to gain access due to a downgrade from arterial to collector. An example of this would be Mountain Highway between Dempsey Road and McNair Drive.

- **Traffic calming:** Vertical deflection measures are considered either on local or collector roads. Traffic calming measures are generally not considered on arterial roads. Both Edgemont Boulevard and Ridgewood Drive, for example, may be eligible for traffic calming consideration once they are downgraded to become collector roads.

As illustrated above, the proposed road classification system may not cause a significant change to daily engineering operations. However, planning decisions and infrastructure funding priorities will more likely be impacted by the new system in the long term.

6. CONCLUSIONS

The existing roadway classification system is based on the "North Vancouver Transportation Network Study" which was developed more than 20 years ago. This report is intended to examine the existing roadway classification in the District of North Vancouver and to redefine the operations guidelines for each roadway class to better reflect current conditions.

Several meetings were held for consultation and input with the core team comprising District staff. The analysis and maps in the report were created with the assistance by GIS staff. The updated roadway system will have to be adopted by the District Council for amendment in the Development Servicing Bylaw No. 7388 (2005). The existing classification system consists of four road classes: major arterial, minor arterial, collector, and local roads.

The following roadway classification system options were developed and evaluated:

- Option 1: Keep the current classification system with minor modifications.
- Option 2: Combine minor arterial and collector classes.
- Option 3: Combine major and minor arterial classes.
- Option 4: Re-define by role and land use.

Each of these options has its own pros and cons, and is evaluated against five categories: simplicity in implementation, cost effectiveness, appropriate road geometry, anticipated safety improvement, and accommodation of alternate modes. Option 1 was ranked the highest with a total score of 12 out of 15. Therefore, it is recommended that the current classification system remains, with corresponding adjustments to the guidelines. However, the addition of a rural road classification is also recommended.

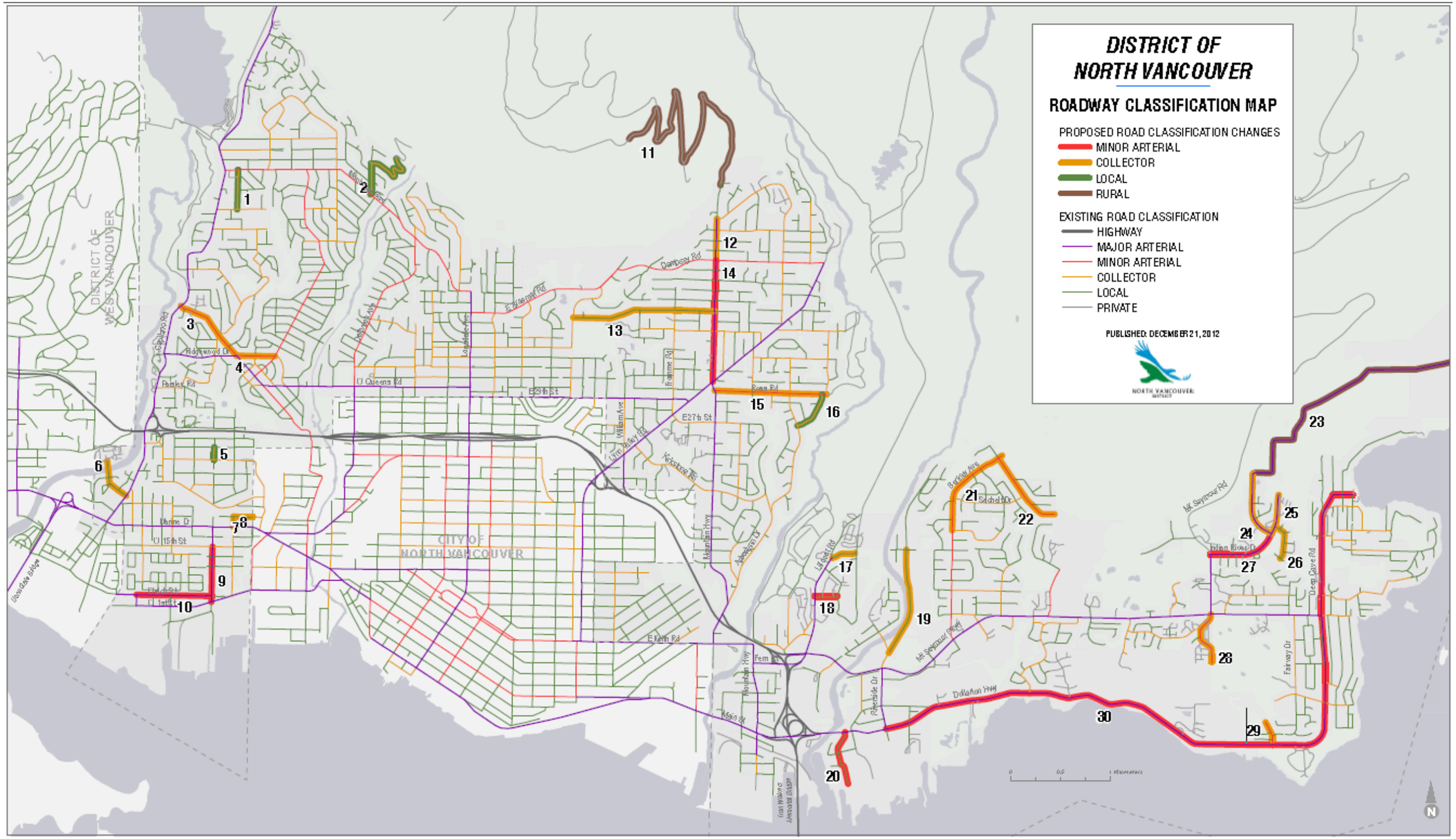
One of the key changes to the guidelines is the traffic volume range for each road class. The traffic volume of minor arterial road class has been modified to be between 5,000 and 20,000 vehicles per day (existing between 3,000 and 10,000 vehicles per day). The purpose is to have roads carrying traffic volumes between 8,000 and 20,000 vehicles per day designated as minor arterial roads, which emphasize traffic movement over land access. Minor arterial roads which have less than 8,000 vehicles per day and provide accesses to adjacent land use are likely to be reclassified as collector roads.

Another key change to the guidelines is the inclusion of alternate transportation considerations such as transit, bicycle and pedestrian facilities. The intent is to ensure that the roadway classification is appropriate for the types of facilities provided for these alternate transportation options. These requirements are consistent with those specified in the Development Servicing Bylaw.

After applying the updated guidelines to the current District road network, there are 30 road segments identified to be reclassified after evaluating their actual traffic demands, pavement widths, and usage. These road segments are listed in Appendix C.

APPENDIX A

Roadway Classification Maps



Map 1: Proposed Changes to Road Classification

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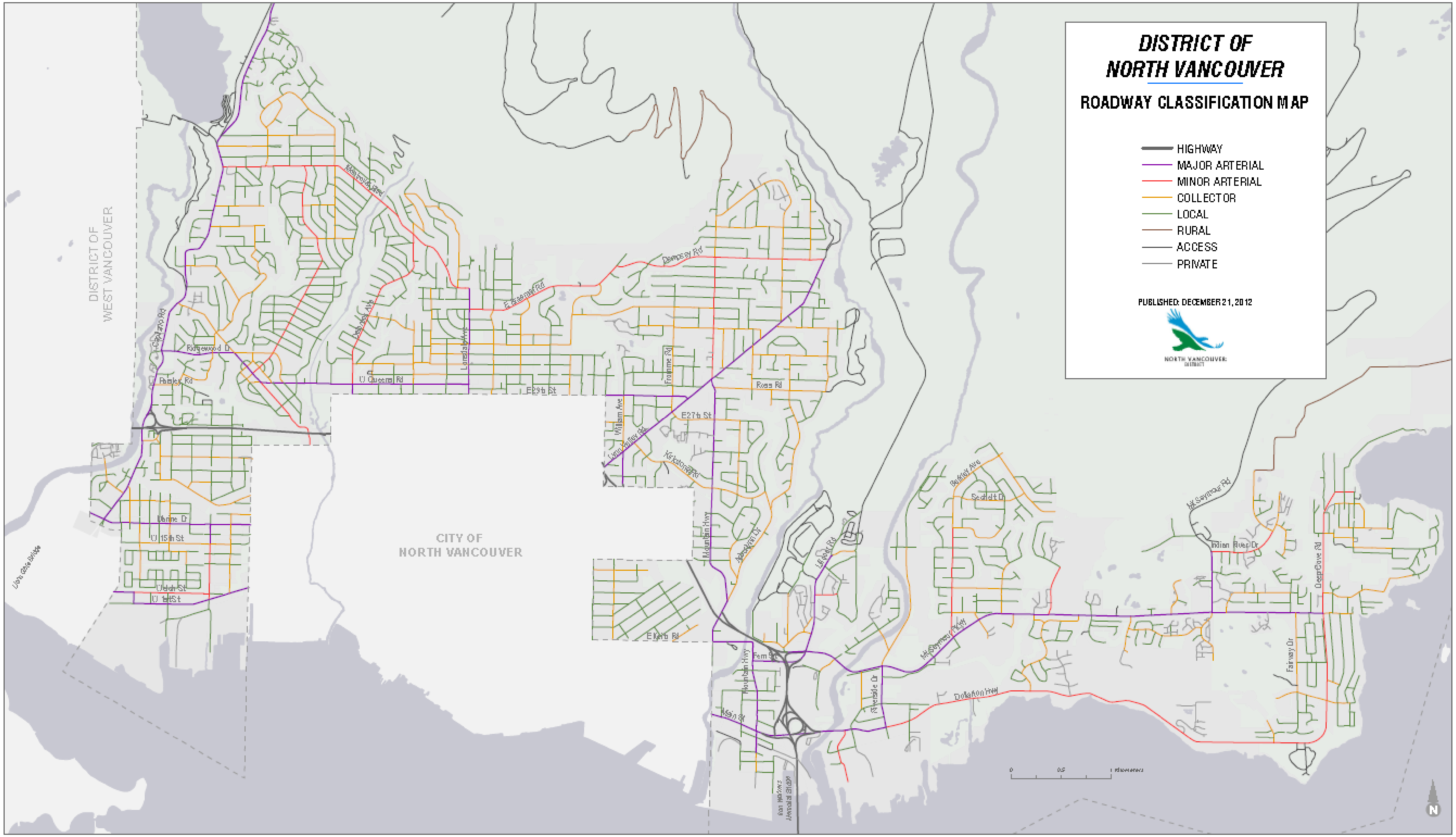

Map 2: Proposed Complete Road Classification

APPENDIX B

Details of DNV Urban Road Classification System Features

The following explains each feature in the DNV Recommended Roadway Classification Guidelines in the report.

Traffic service function

All roads provide traffic movement, access to adjacent land use, or both. Typically, lanes and local roads are used for land access. Arterial roads provide for traffic movement as the main service function. Collector roads provide for both.

Expected traffic volume (AADT - Average Annual Daily Traffic)

The volumes are measured for both directions and there can be a wide volume range for each classification. For example, the AADT ranges between 1,000 and 8,000 for collector roads, and between 5,000 and 20,000 for minor arterial roads in the recommended guidelines.

Speed limit (km/h)

The legal speed limit on local, collectors, and arterials is typically 50 km/h, although there may be exceptions. Examples include 40 km/h on Fairway Drive (collector) and 60 km/h on Mount Seymour Parkway (major arterial). School zone speed limit of 30 km/h is typically posted and enforced during school hours on roads abutting the schools. The speed limit for all lanes in the District is 20 km/h.

Vehicle type

All roads are designed to service various vehicle loads and have different road base and pavement design requirements. Residential local roads are not expected to handle heavier vehicles such as buses and large commercial trucks. For such reason, transit routes and truck routes are not usually on local roads.

Desirable connections

Arterial roads carry higher through traffic speeds and volumes, and local roads usually carry lower traffic speeds for land access purposes. To ensure the safety and efficiency of a transportation network, connections of adjacent or same road classes should be encouraged. For example, arterial roads should be connected with arterial roads or collector roads, which in turn should be connected with arterial, collector, or local roads. However, there can be exceptions to this ideal connection configuration in the District.

Transit service

Transit routes are typically on collector or arterial roads, although local roads may be used in rare occasions and should be avoided.

Bicycle access

There are a number of designated bicycle routes in the District. Most existing bicycle routes are on arterial roads, and there are planned routes on collector and local roads in the North Vancouver Bicycle Master Plan. Depending on traffic conditions and road widths, the type of bicycle facilities provided on these routes may vary.

Pedestrian access

The Development Servicing Bylaw has specific requirements as to the number and width of sidewalks for each road class and type. For example, two 1.5-metre sidewalks are required on a residential collector road. The design requirements from the Development Servicing Bylaw are shown in Exhibit 5 on the next page.

Table B1 – Road Classification

Road Type	Right-of-Way Width (metres)	Pave-ment (curb to curb) Width (metres)	Curb and Gutter Type Required on both sides of all roads	Sidewalk Number Required	Sidewalk Width (metres)
Arterial- Divided 4-Lane with median and bike lanes	35.1	22.3	Barrier Curb	Both sides	2.0m
Arterial- Divided 4-Lane with median and shared vehicle/bike lanes	33.3	20.5	Barrier Curb	Both sides	2.0m
Arterial- Undivided 4-Lane with bike lanes	30.6	17.8		Both sides	2.0m
Arterial- Undivided 4-Lane with shared vehicle/bike lanes	28.8	16.0		Both sides	2.0m
Collector- Divided Commercial (Industrial) - with bike lanes	28.0	19.3		Both sides	1.8m
Collector- Divided Commercial (Industrial) - with shared vehicle/bike lanes	26.2	17.5		Both sides	1.8m
Collector- Residential – with bike lanes	25.3	16.2		Both sides	1.5m
Collector- Residential – with shared vehicle/bike lanes	24.3	15.2		Both sides	1.5m
Local- Commercial (Industrial)	21.4	12.2		Both sides	1.8m
Local- Residential Multi Family	18.0	11.2		One side	1.5m
Local- Residential Single Family	16.5	8.0	Roll-over curb*	One-side*	1.5m
Lane– Commercial (Industrial)	8.0	6.0	Roll-over curb*	Not required	
Lane- Residential	6.0	4.0	Not req'd	Not required	
Alternative Local Road - Residential Cul-de-sac	16.5	6.7	Roll-over curb	Not required	
Alternative Local Road - Through Collector Residential	20.0	7.3	Barrier curb	One-side	1.5m
Alternative Local Road - No Curbs	16.5	6.0	Not required	Not required	
Alternative Collector Road – No Curbs	20.0	7.3	Not required	Not required	

*Except when adjacent to sidewalks and in areas designated for institutional, park or multi-family uses, then barrier curbs are required, and two sidewalks may be required.
Refer to the Supplementary Standard Drawings contained in Schedule D.2.2 for typical road cross sections.

Exhibit 5: Schedule D.1 Design Criteria Manual,

Development Servicing Bylaw No. 7388

Right-of-way width (m) / Pavement width (m) / Number of travel lanes / Number of parking lanes / Recommended width of travel lane (m)

Each roadway class has its own design criteria specified in the Development Servicing Bylaw. The road widths, above ground utilities, parked vehicles and other features on or along the roads affect drivers' expectations. A typical lane width with markings is between 3.3 m and 3.7 m, and sometimes it may go up to 4.3 m for a wide shared curb lane. The parking requirements vary based on roadway widths and adjacent land uses.

Driveway access

The Development Servicing Bylaw has specific requirements on the widths and locations of new single family residential driveways. Most accesses should be constructed off of lanes or local roads wherever physically possible. Residential driveway access to arterial roads is restricted in most situations.

APPENDIX C

Proposed List of Classification Changes

Roadway Re-classification List			1/29/2013		**Daily Traffic Volumes - Two ways (AADT)**			
#	**Roadway Section**	**Current Classification**	**Proposed Classification**	**Reason for the Proposed Classification**	**Current**	**Forecast OCP Volumes (Near 100's)**	**Lower Cut-Off for Proposed Classification**	**Upper Cut-Off for Proposed Classification**
1	Glenwood Ave, between Montroyal Blvd and Handsworth Rd	Collector	Local	Volume	900	900	1	1,500
2	Skyline Dr, 4800 Blk and beyond	Collector	Local	Road width	500	500	1	1,500
3	Edgemont Blvd, between Capilano Rd and Ridgewood Dr	Minor Arterial	Collector	Volume; traffic from development in Edgemont Village unlikely enough for arterial	3,000	3,300	1,000	8,000
4	Ridgewood Dr, between Edgemont Blvd and Highland Blvd	Minor Arterial	Collector	Volume; now two lanes, no transit; traffic from development in Edgemont Village unlikely enough for arterial	4,500	5,000	1,000	8,000
5	Pemberton Ave, between W. 22nd St and W. 23rd St	Collector	Local	Narrow road width more suitable for a local road	500	500	1	1,500
6	Fullerton Ave, west of Capilano Rd	Local	Collector	Volume generated by Woodcroft Estates	3,000	3,600	1,000	8,000
7	W. 17th St, between Lloyd Ave and MacKay Ave	Local	Collector	Volume; current bus route	2,000	2,300	1,000	8,000
8	Lloyd Ave, between Marine Dr and W. 17th St	Local	Collector	Volume; current bus route	2,000	2,300	1,000	8,000
9	Pemberton Ave, between W. 1st St and W. 15th St	Major Arterial	Minor Arterial	Volume; traffic demand due to port expansion unlikely to need major arterial	6,000	7,000	5,000	20,000
10	Welch St, between Garden Ave and Pemberton Ave	Major Arterial	Minor Arterial	Volume, road width and lack of transit indicate a collector; however, may have a traffic demand from future industrial development; could be collector once Lower Level Road exteneded to the west	3,800	4,400	5,000	20,000
11	Mountain Hwy, north of Borthwick Rd	Access	Rural	Road width; traffic volume; rural road type	Under 200	Under 200	1	2,000
12	Mountain Hwy, between Dempsey Rd and McNair Dr	Major Arterial	Collector	Volume	4,000	4,200	1,000	8,000
13	Wellington Dr, Princess Ave to Mountain Hwy	Local	Collector	Volume; function of the road	1,300	1,500	1,000	8,000
14	Mountain Hwy, between Lynn Valley Rd and Dempsey Rd	Major Arterial	Minor Arterial	Volume	8,400	10,100	5,000	20,000
15	Ross Rd, between Mountain Hwy and Duval Rd	Minor Arterial	Collector	Volume and road width; originally envisioned as east-west alternate route	3,700	4,100	1,000	8,000

Roadway Re-classification List			1/29/2013		**Daily Traffic Volumes - Two ways (AADT)**			
#	**Roadway Section**	**Current Classification**	**Proposed Classification**	**Reason for the Proposed Classification**	**Current**	**Forecast OCP Volumes (Near 100's)**	**Lower Cut-Off for Proposed Classification**	**Upper Cut-Off for Proposed Classification**
16	Wembley Dr, between Hoskins Rd and Ross Rd	Collector	Local	Volume	600	700	1	1,500
17	Lillooet Rd, between Lillooet Ln and Monashee Dr	Local	Collector	Transit route to Capilano University	5,000	5,500	1,000	8,000
18	Purcell Way, east of Lillooet Rd	Local	Minor Arterial	Volume; currently bus route; Old Lillooet Rd extension may share the volume in longer term	10,000	11,000	5,000	20,000
19	Riverside Dr, between Grantham Pl and Swinburne Ave	Local	Collector	Volume; function of the road	2,100	2,200	1,000	8,000
20	Riverside Dr (W), south of Dollarton Hwy	Local	Minor Arterial	Services truck volume in Maplewood industrial area; pavement design as an arterial road	2,000	2,400	5,000	20,000
21	Berkley Ave, between Byron Rd and Hyannis Dr	Minor Arterial	Collector	Volume	3,400	3,600	1,000	8,000
22	Hyannis Dr, east of Berkley Ave	Minor Arterial	Collector	Volume; originally envisioned as an east-west connector	1,300	1,400	1,000	8,000
23	Indian River Dr (4100 Blk and beyond), east of Indian River Cres	Major Arterial	Rural	Road width; traffic volume; rural road type	1,200	1,300	1	2,000
24	Indian River Cres, northwest of Indian River Dr	Major Arterial	Collector	Volume	2,000	2,100	1,000	8,000
25	Indian River Dr, north of Indian River Cres	Major Arterial	Collector	Volume	1,500	1,600	1,000	8,000
26	Coldwell Rd, east of Indian River Dr	Local	Collector	Collects and distributes traffic from local roads	1,300	1,400	1,000	8,000
27	Indian River Dr, between Mt Seymour Rd and Indian River Cres	Major Arterial	Minor Arterial	Volume; extension to new subdivision was originally envisioned	5,200	5,500	5,000	20,000
28	Roche Point Dr, south of Mt Seymour Pkwy	Minor Arterial	Collector	Volume; extension was originally envisioned but not planned now	2,600	2,700	1,000	8,000
29	Roche Point Dr, north of Dollarton Hwy	Minor Arterial	Collector	Road width, extension not planned now	1,500	1,600	1,000	8,000
30	Dollarton Highway/Deep Cove Rd, between Riverside Dr and Banbury Rd	Major Arterial	Minor Arterial	Volume; function of the road	8,000	9,200	5,000	20,000