



Edgemont Village Traffic and Parking Technical Report January 2014

In the fall of 2013, the District of North Vancouver engaged consultants to assess existing intersection and parking conditions in Edgemont Village. The consultant report also identified potential intersection and parking improvements that could be implemented in the future to support the continued vibrancy of the village. Based on the outcome of the study, the District is confident there are several potential improvements that are technically viable and would work well in the coming years.

- The technical analysis **confirmed residents' insights** that:
 - some key intersections operate below standard, creating excessive delay; and
 - parking occupancy is high during peak times.
- Intersections were assessed using national standards and considered the needs of **pedestrians of all ages and abilities**, including children and families walking to school.
- **Improvements at six intersections** can be implemented to improve operational efficiency and safety. Design for intersection improvements should prioritize pedestrians while considering bicycle, goods movement, and vehicle needs at key intersections.
- The **parking assessment** confirmed the following:
 - During peak times, on-street parking with occupancy over 85 percent generally results in motorists circling to find parking;
 - Additional on-street time limits (short term parking) could improve conditions;
 - Laneways provide valuable parking supply in the Village, particularly during the busiest period, which is Saturdays; and
 - Many existing older buildings provide fewer parking spaces than would be required under the District's current commercial parking requirement but more off-street commercial parking will be achievable with redevelopment in the Village.
- The North Vancouver Bicycle Master Plan (2012) and North Shore Area Transit Plan (2012) identify the long term **cycling and transit network for this area**. The District's cycling and transit plans for Edgemont Village are to be consistent with those plans. This study did not further assess cycling or transit infrastructure.
- The District expects that developments will provide an exemplary **construction management plan** to minimize area traffic disruptions

A full copy of the study follows.

REPORT



Edgemont Village Centre Traffic and Parking Technical Report



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Executive Summary

In Fall 2013, Urban Systems completed a Traffic and Parking Study for Edgemont Village Centre on behalf of the District of North Vancouver. The initiative is part of a larger effort to refresh the local plan for Edgemont Village, located on the west side of the District. The Study examined opportunities for improvements to six key intersections, including:

- Edgemont Boulevard & Ridgewood Drive
- Edgemont Boulevard & Highland Boulevard
- Edgemont Boulevard & West Queens Road
- Woodbine Drive & West Queens Road
- Colwood Drive & West Queens Road
- Ridgewood Drive / Colwood Drive & Highland Boulevard

Edgemont Village is a vibrant community with local services, single family homes, and multi-family homes. Ongoing development interests may lead to redevelopment in this area, making the need to assess the safety, accessibility, and operations of these six intersections, as well as a review of parking within the study area, important to the District.

The traffic review included a summary of recent work, a traffic and operations analysis, and identification of issues, challenges, and opportunities for each identified intersection. The result of the study shows three of the six intersections operate below an acceptable level of service during peak periods. Multiple recommendations were made to improve the operation of each intersection as well as safety and accessibility. Key intersection and parking recommendations include:

- Improve intersection control at Edgemont Boulevard & Ridgewood Drive, Edgemont Boulevard & Highland Boulevard, and Colwood Drive & West Queens Road.
- As redevelopment occurs, consider the potential to realign Woodbine Drive & West Queens Road.
- Consider further time restrictions on streets where parking is more than 80% full.
- Require developers to provide the minimum amount of commercial parking required by bylaw.

Parking in Edgemont Village was identified through the Edgemont Village planning process as a major concern for residents. Parking occupancy in the study area varies depending on the time of day and specific area, with on-street parking experiencing a higher demand than off-street parking. The review includes a summary of past work, results of parking data collection in the core of the study area, a summary of current challenges, and opportunities for improvements.

Aside from the technical focus of this study, the District and the consultant team worked with the public to further understand the challenges associated with traffic and parking in Edgemont Village. Overall, community members participating in the public consultation process were generally supportive of the opportunities that are proposed within this Parking and Traffic Technical Report.

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1.0 Introduction

The District of North Vancouver (District) is refreshing the local plan for Edgemont Village. The refresh includes guidelines for the form and character of buildings, public realm improvements, and policies relating to housing and transportation. As part of this effort, the District commissioned Urban Systems (Urban) to review the existing transportation network and identify current issues, challenges and opportunities. This report is the result of Urban's review of existing transportation conditions.

2.0 Context

Edgemont Village is a community in the west of the District with a mix of commercial “main street” type land use, multi-family residential, and single family homes. Ongoing development interests may lead to redevelopment in this area. Past studies have also indicated that improvements are needed to the existing transportation network and feedback from public consultation events concerning the Edgemont Village Refresh indicated that existing safety and operations at key intersections and parking were key concerns. This assessment of existing conditions focuses on those two areas of concern. Figure 1 shows the intersections considered, the parking review assessment area, and overall study area.



Figure 1: Study Area

3.0 Traffic Review

The traffic review focused on existing traffic conditions at key study intersections within and around Edgemont Village. It included a summary of recent work by other consultants, traffic and operations analysis, and identification of issues, challenges, and opportunities.

This section describes the results of Urban's review of the six study area intersections. The first section describes the overall approach to intersection analysis and typical options for intersection improvements. The second section provides detailed information about the review of each intersection.

3.1 Approach and Improvement Options

3.1.1 *Traffic Analysis Approach*

Traffic analysis included traffic data collection, analysis of traffic operations at intersections using Synchro, and traffic signal warrant analysis, as applicable. The number of recent collisions at each intersection was also noted based on ICBC's Crash Maps.¹

The intersection analysis was completed using two sources of data: recent turning movements (2006 – 2012) and 24-hour two-way screenline traffic volumes collected in October, 2013. The two-way screenline counts were used in the warrant assessments, which require data over six or seven hours. The screenline counts were also used to assess changes in traffic patterns. Turning movement counts were adjusted to reflect 2013 conditions based on the screenline volumes. Based on this information, it was observed that traffic volumes on Edgemont Boulevard and Highland Boulevard have increased since the original turning movement counts were collected, while volumes on West Queens Road and Woodbine Drive have remained stable. Recently installed traffic calming measures on Colwood Drive seem to have been effective – traffic volumes have decreased around 15% since 2007. The increase in traffic volumes on Edgemont Boulevard and Highland Boulevard may be due to traffic that has been rerouted away from Colwood Drive.

Two types of signal warrants were conducted at the study area intersections. The Transportation Association of Canada (TAC) Signal Warrant analysis uses six hours of turning movement volumes, along with geometric, demographic, and other factors to assess if a signal meets the technical warrant.

The British Columbia signal warrant is based on the Electrical and Traffic Engineering Design Guideline from the Engineering Branch of the British Columbia Ministry of Transportation. These design guidelines identify nine warrants to be used to help determine if the installation of a traffic signal will improve the overall safety and/or operation of the intersection. This guideline notes that signals should not be installed unless one or more of the warrants are met, but that satisfaction of a warrant does not in itself justify a signal. The nine warrants are as follows:

- Warrant 1: Minimum Vehicular Volume

¹ http://www.icbc.com/about-ICBC/news_room/icbc_stats

- Warrant 2: Interruption of Continuous Traffic
- Warrant 3: Progressive Movement
- Warrant 4: Accident Experience
- Warrant 5: System Warrant
- Warrant 6: Combination Warrant
- Warrant 7: Four Hour Volume Warrant
- Warrant 8: Peak Hour Delay
- Warrant 9: Peak Hour Volume

3.1.2 *Intersection Improvement Options*

Each study intersection includes specific considerations that related to improvement options, including traffic patterns, geometry, land use, and sustainable mode requirements; however, there are some improvements that are expected to be common opportunities throughout Edgemont Village. Some of these improvements are identified below:

- Signalization: installing a new signal is an option at intersections that meet one or more signal warrants and where supported by engineering judgement.
 - Advantages:
 - Increase the capacity of the intersection for vehicles and reduce delay to previously stop-controlled traffic.
 - Provide safe crossing opportunities for bicycles and pedestrians.
 - May reduce some collision types, especially angle collisions.
 - Can be coordinated with nearby intersections to encourage drivers to travel at the speed limit.
 - Can provide gaps in approaching traffic on major streets at nearby unsignalized intersections.
 - Disadvantages:
 - May increase the number of rear-end collisions.
 - Increases delays to the major street when transitioning from two-way stop control to signalization.
 - Signals typically cost around \$250,000 to install.
 - Contraindications:
 - Should not be installed in close proximity to other signalized intersections (within 150 metres) without coordination, operation from a single controller, or other special consideration.
- Roundabout:
 - Advantages:
 - May improve safety by decreasing the number of conflict points (compared to standard signalized and stop-controlled intersections).
 - May reduce collision severity by reducing typical travel speeds of vehicles traversing the intersection and by decreasing the angle of impact during collisions.
 - Increase capacity and reduce delay compared to stop-controlled intersections.

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- Disadvantages:
 - Typically require more right-of-way than a signalized intersection, especially at locations that must accommodate large design vehicles, such as tractor-trailer units.
- Contraindications:
 - Roundabouts experience the best operation at intersections where the flow of traffic is balanced between the approaches.
 - Should not typically be installed on roadways where approach grades exceed 4%.²
 - Should not be installed where queuing is expected to reach nearby traffic signals or along coordinated signalized corridors.
- Realignment: Many of the intersections in Edgemont Village are offset or skewed. This can result in problems with sight-lines. Realignment can be incorporated with either signalization or the installation of a roundabout.
 - Advantages:
 - Realigning offset intersections with high through movements on the cross-street may improve safety.
 - May improve safety by increasing sight distance.
 - May reduce crossing distance for vehicles, cyclists, and pedestrians
 - In cases where the skew or offset results in unclear travel path for traffic or requires vehicles to leave their lane when making turning movements, realignment may improve safety and driver comfort.
 - Disadvantages:
 - May require significant property to accommodate realignment

3.2 Summary of Review by Intersection

The following section includes a review of each study intersection, including a summary of past work, traffic and operations analysis, summary of issues and challenges, and opportunities. The six intersections included are:

- Edgemont Boulevard & Ridgewood Drive
- Edgemont Boulevard & Highland Boulevard
- Edgemont Boulevard & West Queens Road
- Woodbine Drive & West Queens Road
- Colwood Drive & West Queens Road
- Ridgewood Drive / Colwood Drive & Highland Boulevard

² On roadways with grades greater than 4%, the grade should be reduced to 4% for a minimum of 30 m to 40 m in advance of the roundabout. A grade of 5% may be considered if it can be provided over a longer distance and if the required sight distance is achievable. The grade within the roundabout can vary between 2% and 4%.

The District provided additional information about planned improvements to the intersection at Paisley Road & Ridgewood Drive.

3.2.1 Edgemont Boulevard & Ridgewood Drive

Edgemont Boulevard and Ridgewood Drive is a four-way stop intersection with a channelized right-turn on the northbound approach. This intersection has a skew and is located in a residential/commercial neighbourhood. According to the District's Development Servicing Bylaw (2013) Edgemont Boulevard is a major arterial road between West Queens Road and Ridgewood Drive and a collector road north of Ridgewood Drive. Ridgewood Drive is identified as a major arterial road from Capilano Road to Edgemont Boulevard and a collector road from Edgemont Boulevard to Highland Boulevard. The intersection is shown in Figure 2.



Source: Google Maps

Figure 2: Intersection of Edgemont Boulevard and Ridgewood Drive

3.2.1.1 Summary of Past Work

The intersection of Edgemont Boulevard & Ridgewood Drive has been assessed in the following recent studies:

- Opus Hamilton, Edgemont Village Traffic Operations and Safety Review, 2006
- Bunt & Associates, Edgemont Senior Living Development Final Report, 2013

The following issues and challenges at this intersection were identified in the studies:

- The existing all-way stop experiences high levels of delay for northbound and southbound traffic. (Opus, 2006)
- There is sufficient traffic volume at this intersection to meet a traffic signal warrant. (Opus, 2006)

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- There were 22 collisions from 2001 to 2005, including two conflicts which involved a cyclist and a vehicle and pedestrian and vehicle. The most common collision type was found to be rear-end collisions. (Opus, 2006)
- Pedestrian activity at this intersection may contribute to delay at this intersection during peak periods. (Opus, 2006)
- Aggressive driver behaviour and improper handling of vehicles were observed during peak periods at this intersection. This behaviour can be attributed to delay and queue length. (Opus, 2006).
- The intersection did not meet accessibility standards and did not feature curb let downs to accommodate pedestrian crossings by all users. (Opus, 2006).
- A 2012 Synchro model showed a nine vehicle queue for the northbound direction in the afternoon peak period. Investigators did not observe a nine vehicle queue during field observations of the peak period. (Bunt, 2012)

The past studies recommended the following improvements:

- Installation of larger reflective STOP signs, including an additional STOP sign on the northbound right-turn lane. (Opus, 2006)
- Installation of a traffic signal. (Opus, 2006)
- Pavement treatment on the westbound approach. (Opus, 2006)
- Construction of pedestrian facilities (such as sidewalks, curb letdowns, and marked crosswalks). (Opus, 2006)

3.2.1.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Edgemont Boulevard & Ridgewood Drive are shown in Figure 3.

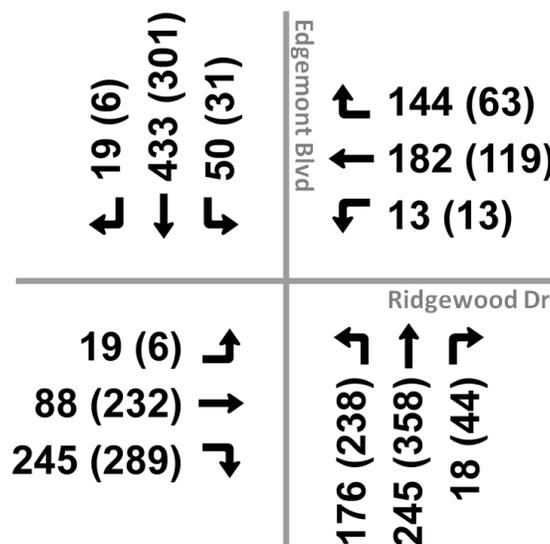


Figure 3: 2013 Traffic Volumes: Edgemont Boulevard & Ridgewood Drive (AM (PM))

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 3. Listed below are the intersection movements experiencing a level of service (LOS) 'E' or worse or a volume to capacity (v/c) ratio greater than or equal to 0.90.

- Morning peak hour:
 - Westbound left-through-right, LOS 'F', v/c ratio: 0.90
 - Northbound left-through, LOS 'F' v/c ratio: 1.12
 - Southbound left-through-right, LOS 'F', v/c ratio: 1.32
- Afternoon peak hour:
 - Northbound left-through, LOS 'F', v/c ratio: 1.42
 - Southbound left-through-right LOS 'E'

Collision data collected from ICBC from 2008 – 2012 recorded 21 report collisions at this intersection. Seven of those collisions were casualties (crashes resulting in injuries - no fatalities were reported in Edgemont Village during this time period) with the remaining 14 collisions being property damage only.

The intersection was found to meet the TAC Traffic Signal Warrant. It also met Warrant 9 from the British Columbia Ministry of Transportation Electrical and Traffic Engineering Design Guideline based on peak hour volumes.

3.2.1.3 Summary of Issues and Challenges

Based on the analysis of existing conditions and summary of past work, the intersection of Edgemont Boulevard & Ridgewood Drive experiences the following issues and challenges:

- Delay exceeds acceptable levels of service for multiple movements in both the morning and afternoon peak hours.
- The analysis confirms that the intersection is currently operating with an overall LOS 'F'. Multiple individual movements have LOS 'E' or 'F' with v/c ratios exceeding 0.95.
- Earlier studies found aggressive driver behaviour and improper handling of vehicles, which could be attributed to delay and queue length.
- Since queues and delays have become longer over time, it can be assumed that earlier observations of aggressive driver behaviour have continued or worsened over time.
- Accessibility standards are not met for pedestrians crossing the intersection.
- The 45 degree skew at this intersection can be expected to lead to safety concerns due to sightline conflicts and driver expectations.
- Both the analysis and historic studies have identified the need for improved intersection control and other measures. The intersection currently meets a traffic signal warrant based on peak hour volumes.

3.2.1.4 Opportunities

There are a number of treatments that could help address the issues outlined above. The identified improvements are based on recommendations of past studies, along with the updated analysis completed by Urban. Each provides an opportunity for improvement, but comes with challenges to operations,

design, and / or implementation. The treatment, opportunity, and any challenges anticipated for implementation are summarized below.

- Consider a traffic signal or a roundabout:
 - Traffic signal:
 - Intersection meets the peak hour volume warrant, and a traffic signal would be expected to reduce delay.
 - May improve operations at nearby intersections by creating 'gaps' in traffic.
 - Should be coordinated with other existing and future signals on Edgemont Boulevard.
 - Should require minimal geometric changes.
 - Roundabout:
 - Expected to improve operation during the peak period to decrease the delays and queue length.
 - Could act as a gateway for the community.
 - Drivers are constantly in a state of movement, which is processed as progress during any commute through this intersection. This can reduce driver frustration and resulting high risk behaviours.
 - Must be designed to accommodate goods movement, including trucks accessing local grocery stores.
 - Should not be applied on roadways with approach grades greater than 4%.³
 - Requires property acquisition to accommodate. One possible configuration of property required is shown in Figure 4. This drawing only reflects the possible scale of property required based on a 50 m diameter roundabout (including sidewalks) and is not based on roundabout design. Actual property requirements should be determined during the design phase.
- Textured or coloured treatment at intersection:
 - A textured or colour treatment at the intersection can reinforce the intersection's role as a gateway, highlight pedestrian activity, increase driver awareness, and may decrease pedestrian/cyclist conflicts.
 - Can be difficult or expensive to maintain.
- Pedestrian accessibility improvements – curb let-downs and sidewalk improvements will make this intersection more accessible and safer for all pedestrians.

³ On roadways with grades greater than 4%, the grade should be reduced to 4% for a minimum of 30 m to 40 m in advance of the roundabout. A grade of 5% may be considered if it can be provided over a longer distance and if the required sight distance is achievable. The grade within the roundabout can vary between 2% and 4%.



Figure 4: Possible Roundabout Property Requirements – Edgemont Boulevard & Ridgewood Drive

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3.2.2 Edgemont Boulevard & Highland Boulevard

This intersection is a two-way stop intersection with the priority given to vehicles traveling on Edgemont Boulevard. The District’s Development Servicing Bylaw (2013) identifies Edgemont Boulevard as a major arterial road. Highland Boulevard is identified as a minor arterial road east of Edgemont Boulevard and a collector road west of Edgemont Boulevard. The intersection is located in a commercial/retail neighbourhood where on-street parking is allowed. There is a median island with landscaping elements. The intersection is shown in Figure 5.



Source: Google Maps

Figure 5: Intersection of Edgemont Boulevard and Highland Boulevard

3.2.2.1 Summary of Past Work

The intersection of Edgemont Boulevard and Highland Boulevard has been assessed in the following recent studies:

- Bunt & Associates, Edgemont Senior Living Development Final Report, 2013
- District of North Vancouver, District of North Vancouver Transportation Plan, 2012
- Opus Hamilton, District of North Vancouver – Road Safety Plan, 2010
- Opus Hamilton, Edgemont Village Traffic Operations and Safety Review, 2006

These studies identified the following issues and challenges at this intersection:

- Pedestrian activity at this intersection is relatively high, especially during the afternoon. (Opus, 2006)
- During the peak period the LOS for eastbound and westbound vehicles decreases to 'E' or worse due to high side street volumes combined with limited crossing gaps. (Opus, 2006)
- There is sufficient traffic volume at this intersection to meet a traffic signal warrant. (Opus, 2006)
- A total of 23 collisions occurred at this intersection from 2001 to 2005. 10 of those collisions involved pedestrians, two of those collision occurred where the pedestrians were directly struck. (Opus, 2006)
- The most common collision type from 2001 to 2005 was rear-end collisions. (Opus, 2006)
- Opus observed aggressive driving behaviour that compromised driver and pedestrian safety. (Opus, 2006)
- Landscaping and planting medians were observed to obstruct drivers' vision. Visual cues on approaching intersection not present. (Opus, 2006)
- This intersection was captured in the Edgemont Senior Development Study completed by Bunt. This report anticipates that on Opening Day of the development (2014), the intersection will be operating at a LOS' D' or better. (Bunt, 2013)
- Identified as having the one of the highest frequencies of pedestrian collisions from 2003 to 2008. (Opus, 2010)
- Identified in the District of North Vancouver Transportation Plan as an intersection for future road safety improvements. (DNV, 2012)

The past studies recommended the following treatment:

- Revise traffic control to all-way stop or traffic signal. (Opus, 2006)
- Increase intersection and crosswalk conspicuity and visibility by providing more visible crosswalk signs, narrowing the Edgemont Boulevard approach lane, and / or providing a raised intersection. (Opus, 2006)

3.2.2.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Edgemont Boulevard & Highland Boulevard are shown in Figure 6.

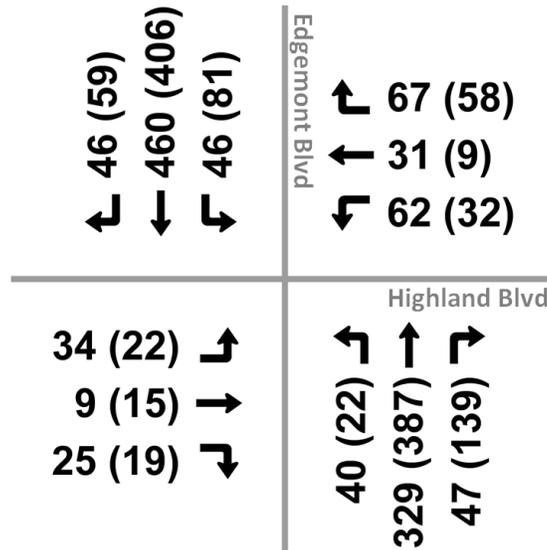


Figure 6: 2013 Traffic Volumes: Edgemont Boulevard & Highland Boulevard (AM (PM))

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 3. Listed below are the intersection movements experiencing a LOS 'E' or worse or a v/c ratio greater than or equal to 0.90.

- Morning peak hour:
 - Eastbound left-through-right, LOS 'E'
 - Westbound left-through-right, LOS 'F'
- Afternoon peak hour
 - Eastbound left-through-right, LOS 'E'

Collision data collected from ICBC from 2008 – 2012 recorded 15 reported collisions at this intersection. One collision was a casualty (crashes resulting in injuries - no fatalities were reported in the Edgemont Village during this time period) with the remaining 14 collisions being property damage only.

The intersection was found to meet the TAC Traffic Signal Warrant. It also met Warrant 2 from the British Columbia Ministry of Transportation Electrical and Traffic Engineering Design Guideline based on average seven-hour volumes.

3.2.2.3 Summary of Issues and Challenges

The intersection of Edgemont Boulevard & Highland Boulevard experiences the following issues and challenges based on the analysis of existing conditions and summary of past work:

- Delay on Highland Boulevard exceeds acceptable levels of service in the morning and afternoon peak hours.
- High pedestrian activity during the afternoon contributes to delay and this intersection was identified in a previous study as having the one of the highest frequencies of pedestrian collisions in the District between 2003 and 2008.
- Existing traffic volumes at the intersection are large enough to meet a traffic signal warrant for average seven hour volumes.
- Landscaping and planted medians were observed to obstruct drivers' vision in a past study.
- The intersection is approximately 125 m from the existing signalized intersection at Edgemont Boulevard and West Queens Road.

3.2.2.4 Opportunities

There are a number of treatments that could help address the issues outlined above. The identified improvements are based on recommendations of past studies, along with the updated analysis completed by Urban. Each provides an opportunity for improvement, but comes with challenges to operations, design, and / or implementation. The treatment, opportunity, and any challenges anticipated for implementation are summarized below.

- Consider a signal or a roundabout:
 - Signal:
 - Intersection meets the seven hour average volume warrant, and a traffic signal would be expected to reduce delay.
 - May improve operations at nearby intersections by creating 'gaps' in traffic.
 - Can be applied along with innovative phasing options, including a potential pedestrian scramble. A pedestrian scramble allows pedestrians protected time within the signal phase. During this time they can cross in any direction. Pedestrian scrambles require consideration of signal timing effects, geometric design, and the needs of the visually impaired before implementation. This would be considered during intersection design.
 - The intersection is less than 150 m from the nearest signalized intersection. Signalization may result in some operational challenges due to the proximity of the two signals. Coordination between the signals should be considered.
 - Roundabout:
 - Requires significant property within an urban, developed area. One possible configuration of property required is shown in Figure 7. This drawing only reflects the possible scale of property required based on a 50 m diameter roundabout (including sidewalks) and is not based on roundabout design. Actual property requirements should be determined during the design phase.
 - May not align with urban design goals for the heart of the village.

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- Consider a four-way stop:
 - Installing a four-way stop at this intersection is expected to reduce delay on Highland Boulevard.
 - Based on Synchro analysis of existing traffic volumes, a four-way stop would result in LOS 'E' for southbound movements in both the a.m. and p.m. direction. Any additional traffic from development is expected to result in additional delays to northbound and southbound traffic.
- Special intersection treatments could be implemented at this intersection. Options include a raised intersection and / or special pavement colour or texture.
 - Treatments may improve safety and reinforce the intersection's role as part of the heart of the community.
 - Some options may have special maintenance considerations.
 - Raised intersections and special pavement treatments require consultation with emergency services and TransLink. These measures may not be possible if they negatively affect these services.
- Consider examining existing intersection geometry and preparing a revised design. Consider updating approach lane widths, corner radii, presence or removal of median, and pedestrian and cycling accommodation. Replace existing cross-walk signage with more visible signs to improve conspicuity.

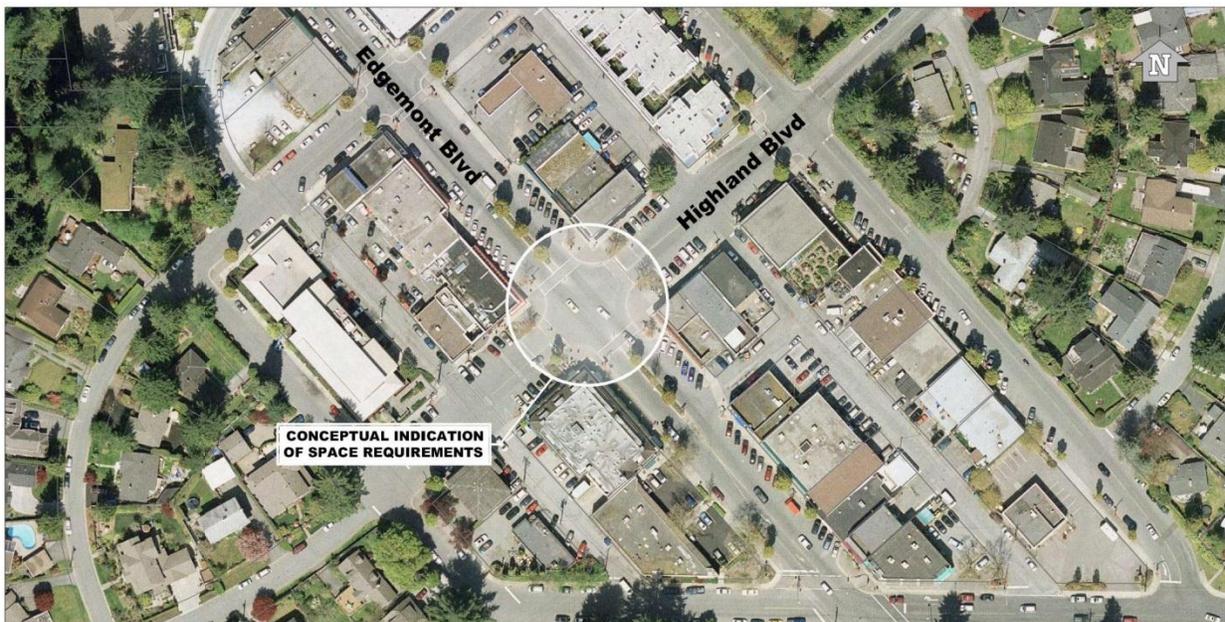


Figure 7: Possible Roundabout Property Requirements – Edgemont Boulevard & Highland Boulevard

3.2.3 Edgemont Boulevard & West Queens Road

This intersection is signalized. The District's Development Servicing Bylaw (2013) identifies Edgemont Boulevard as a major arterial road north of West Queens Road and a minor arterial road south of West Queens Road. West Queens Road is identified as a major arterial road east of Edgemont Boulevard and a collector road west of Edgemont Boulevard. The south and east legs of the intersection have right turn storage bays and the north leg has a southbound left storage bay. Marked crosswalks are also present at three approaches; the west leg does not have a marked crosswalk. The intersection is shown in Figure 8.



Source: Google Maps

Figure 8: Intersection of Edgemont Boulevard and West Queens Road

3.2.3.1 Summary of Past Work

The intersection of Edgemont Boulevard and West Queens Road has been assessed in the following recent study:

- Opus Hamilton, Edgemont Village Traffic Operations and Safety Review, 2006

This study identified the following issues and challenges at this intersection:

- Pedestrian activity at this intersection is high during the mid-day and afternoon peak periods. (Opus, 2006)
- Pedestrian accommodation not provided on west leg. (Opus, 2006)
- LOS at this location was 'C' or better for all movements during the peak periods. (Opus, 2006)
- Intergreen intervals for all movements were found to be less than recommended intergreen intervals calculated using the Institute of Transportation Engineers (ITE) method. (Opus, 2006)

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- The turning path from the eastbound to the northbound is unclear. (Opus, 2006)
- There were 29 collisions at this location (2003 to 2005). 54% of these were rear-end collisions and 21% were fixed object collisions. Collisions appeared to be more frequent during winter months and during the midday and afternoon peak periods. The remaining collisions were a mix of types. (Opus, 2006)
- There are a number of power poles and lamp standards close to the curb near the intersection. This may be reflected in the number of fixed object collisions. (Opus, 2006)
- Southbound through lane not properly aligned with the receiving lane. (Opus, 2006)
- Secondary signal head for westbound vehicles not conspicuous for drivers. (Opus, 2006)
- Lane accesses are close to the intersection. There are too many access points on the east leg of the intersection. (Opus, 2006)
- On-street parking on the west leg is permitted close to the intersection. (Opus, 2006)

The past studies recommended the following treatment:

- Provide pedestrian facilities on the west leg. (Opus, 2006)
- Revise intersection signal head size and location. (Opus, 2006)
- Revise intergreen timings. (Opus, 2006)
- Restrict on-street parking near the lane to the west. (Opus, 2006)
- Mark guidance lines for southbound vehicles through the intersection. (Opus, 2006)
- Remove fixed objects close to the intersection. (Opus, 2006)

3.2.3.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Edgemont Boulevard & Ridgewood Drive are shown in Figure 9.

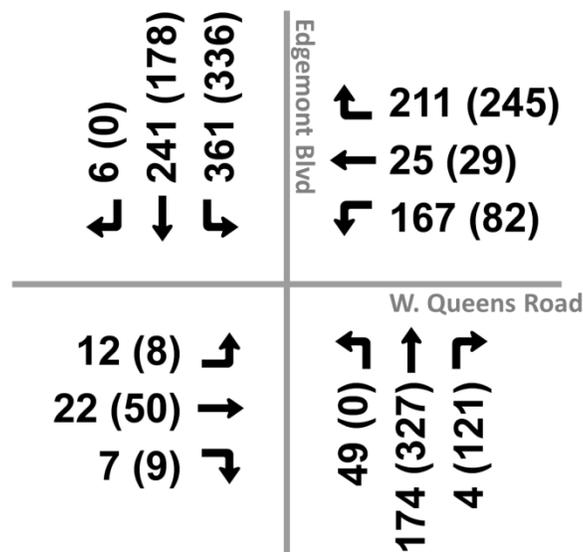


Figure 9: 2013 Traffic Volumes: Edgemont Boulevard & West Queens Road (AM (PM))

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 12. All movements at this intersection operated with LOS 'D' or better and v/c ratios less than 0.90 in both the morning and afternoon peak hours.

Collision data collected from ICBC from 2008 – 2012 recorded 25 reported collisions at this intersection. Six of these collisions were casualties (crashes resulting in injuries - no fatalities were reported in Edgemont Village during this time period) with the remaining 19 collisions being property damage only.

3.2.3.3 Summary of Issues and Challenges

The intersection of Edgemont Boulevard & West Queens Road experiences the following issues and challenges based on the analysis of existing conditions and summary of past work:

- Intersection operates at an acceptable level of service for all movements in both peak periods.
- High pedestrian activity on north and east legs of intersection with some pedestrian activity on west leg where there is no cross-walk. This may lead to safety concerns.
- Relatively high pedestrian activity during the peak periods may contribute to intersection delay and queue lengths at this intersection.
- Past studies indicate that the turning path for eastbound to northbound is unclear and that the southbound receiving lane is not aligned with the southbound through lane.
- Past studies indicate that the signal head is not conspicuous to westbound drivers.
- Utility poles close to curbs may result in a higher than expected percentage of collisions with fixed objects.
- Multiple conflict potentials on West Queens Road may contribute to collisions; parking on the west leg of West Queens Road is close to the intersection and there are accesses and an lane close to the intersection on the east side.
- Past studies indicate that rear-end collisions are common and that intergreen times are not aligned with recommendations from ITE.

3.2.3.4 Opportunities

There are a number of treatments that could help address the issues outlined above. The identified improvements are based on recommendations of past studies, along with the updated analysis completed by Urban. Each provides an opportunity for improvement, but comes with challenges to operations, design, and / or implementation. The treatment, opportunity, and any challenges anticipated for implementation are summarized below.

- Consider realigning the intersection to provide better sight lines, turning paths, and alignment of southbound through lanes. Eliminate southbound channelized right turn lane as part of the realignment.
 - Realignment would address many safety concerns and improve operations.
 - Requires property and removal of existing buildings.
 - May change triangular shape of parcels at the community gateway at Edgemont Boulevard and West Queens Road.
- Add paint markings through the intersection identifying the turning path for eastbound to northbound vehicles.
- Provide a crosswalk on the west leg and consider removing the channelized right turn lane.

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- Improve signal head size and location.
- Re-examine and update signal timings, including intergreen timings.
- Increase setback from the intersection and lane to parking on the north side of West Queens Road.
- Consider consolidating accesses onto Edgemont Boulevard. All existing properties have lane access.

The development taking place in the northwest corner of this intersection is expected to construct improvements, including eliminating the right turn channelization on the southeast approach, adding a crosswalk on the west leg, improving signal heads to meet or exceed standards, and reviewing the signal timing plan. These improvements address several of the opportunities identified above.

3.2.4 Woodbine Drive & West Queens Road

This intersection is a two-way stop intersection with the priority given to vehicles traveling on West Queens Road. The District's Development Servicing Bylaw (2013) identifies West Queens Road as a major arterial road and Woodbine Drive as a collector road. The intersection is located between the commercial/retail space on the west and the residential neighbourhood on the east. The intersection is offset and the south leg is skewed.

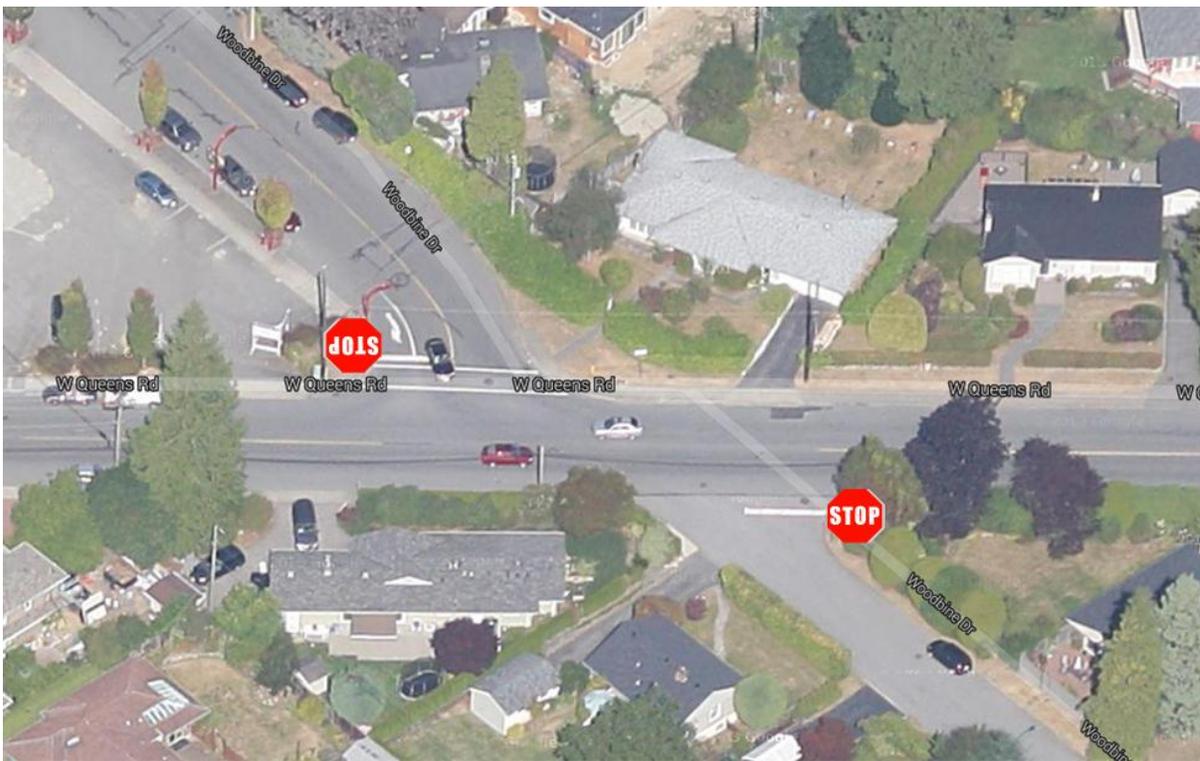


Figure 10: Intersection of Woodbine Drive and West Queens Road

Source: Google Maps

3.2.4.1 Summary of Past Work

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The intersection of Edgemont Boulevard and Highland Boulevard has been assessed in the following recent studies:

- Opus Hamilton, Edgemont Village Traffic Operations and Safety Review, 2006

This study identified the following issues and challenges at this intersection:

- Southbound left-turn experiences LOS 'E' or better during the peak periods. All remaining movements were found to operate at an acceptable LOS. (Opus, 2006)
- Increased delay and long queue appeared to result in driver frustration. Drivers were observed failing to yield during times of congestion. (Opus, 2006)
- There is sufficient traffic volume at this intersection to meet a traffic signal warrant. (Opus, 2006)
- Seven collisions occurred at this intersection (2003 to 2005); all collisions involved southbound vehicles, the majority of which were turning left. Half of all collisions with recorded contributing factors cited driver impatience as the cause. (Opus, 2006)
- Site observations indicate sightline concerns in both directions. To the east sightlines are obstructed by landscaping. (Opus, 2006)

Past studies have recommended the following treatments at this intersection:

- Restrict on-street parking near the intersection.
- Trimming the shrubbery on the northeast corner.

3.2.4.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Woodbine Drive & West Queens Road are shown in Figure 11.

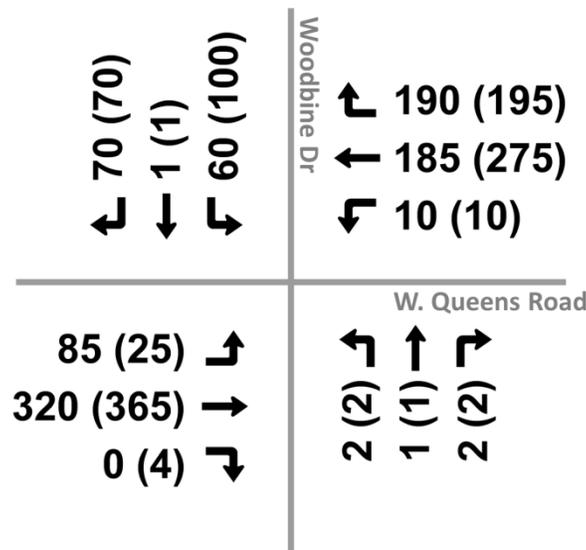


Figure 11: 2013 Traffic Volumes: Woodbine Drive & West Queens Road (AM (PM))

Edgemont Village Centre

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 12. All movements at this intersection operated with LOS 'D' or better and v/c ratios less than 0.90 in both the morning and afternoon peak hours.

Collision data collected from ICBC from 2008 – 2012 recorded 6 reported collisions at this intersection. Four of these collisions were casualties (crashes resulting in injuries - no fatalities were reported in Edgemont Village during this time period) with the remaining 2 collisions being property damage only.

This intersection did not meet the TAC Traffic Signal Warrant. It did meet Warrant 2 from the British Columbia Ministry of Transportation Electrical and Traffic Engineering Design Guideline site observations conducted in October, 2013 indicate that landscaping on the northeast corner of the intersection continues to restrict sight lines.

3.2.4.3 Summary of Issues and Challenges

The intersection of Woodbine Drive & West Queens Road experiences the following issues and challenges based on the analysis of existing conditions and summary of past work:

- Offset intersection and landscaping on the northeast corner of the intersection obstructs drivers' vision.
- Existing volumes at the intersection are large enough to meet British Columbia Ministry of Transportation Warrant 2; however, the intersection did not meet the TAC Traffic Signal Warrant and the proximity to the existing traffic signal at Edgemont Boulevard & West Queens Road would make the installation of a traffic signal or roundabout at this location challenging.
- The intersection is approximately 100 m from the existing signalized intersection at Edgemont Boulevard and West Queens Road.
- Past studies indicate that collisions at this intersection are related to driver impatience. Current analysis did not show unacceptable levels of delay; however, gaps in traffic may be limited because of the distance between this intersection and the nearest traffic signal to the east.

3.2.4.4 Opportunities

There are a number of treatments that could help address the issues outlined above. The identified improvements are based on recommendations of past studies, along with the updated analysis completed by Urban. Each provides an opportunity for improvement, but comes with challenges to operations, design, and / or implementation. The treatment, opportunity, and any challenges anticipated for implementation are summarized below.

- Consider realigning intersection to match the north and south legs and to align the south leg perpendicular to West Queens Road.
 - Realignment will require additional property. Options for realignment and property requirements to be determined through detailed design as surrounding sites redevelop.
- Consider improvements at West Queens Road & Colwood Drive that will provide more gaps in westbound traffic for southbound drivers on Woodbine Drive.
- Other improvements that may increase sight lines include:
 - Restricting on-street parking near the intersection.
 - Trimming the shrubbery on the northeast corner.

3.2.5 Colwood Drive & West Queens Road

This intersection is a two-way stop intersection with the priority given to vehicles traveling on West Queens Road. The District's Development Servicing Bylaw (2013) identifies West Queens Road as a major arterial road and Colwood Drive as a collector road north of this intersection and a local road south of this intersection. The intersection is located in a residential neighbourhood. Colwood Drive & West Queens Road has a skew and is slightly offset. This intersection is an important crossing for students living south of West Queens Road with Highlands Elementary School located north of this intersection on Colwood Drive. There is an existing special crosswalk on the west leg.



Figure 12: Intersection of Colwood Drive and West Queens Road

Source: Google Maps

3.2.5.1 Summary of Past Work

None of the past studies included in Urban's review provided specific observations or recommendations about this intersection. The District installed speed humps on Colwood Drive north of this intersection in 2009 to slow traffic speeds around the school. The measures resulted in a reduction in traffic volumes on Colwood Drive.

3.2.5.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Colwood Drive & West Queens Road are shown in.

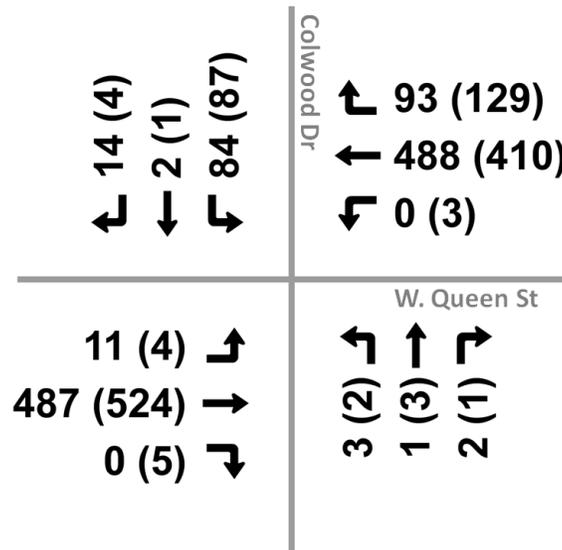


Figure 13: 2013 Traffic Volumes: Colwood Drive & West Queens Road (AM (PM))

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 13. Listed below are the intersection movements experiencing a level of service of E or worse, or a volume to capacity ratio greater than or equal to 0.90.

- Morning peak hour
 - Southbound left-through-right, LOS 'E'
- Afternoon peak hour
 - Southbound left-through-right, LOS 'E'

Collision data collected from ICBC from 2008 – 2012 recorded 12 reported collisions at this intersection. Nine of these collisions were casualties (crashes resulting in injuries - no fatalities were reported in Edgemont Village during this time period) with the remaining three collisions being property damage only.

This intersection did not meet the TAC Traffic Signal Warrant. It met Warrant 2 from the British Columbia Ministry of Transportation Electrical and Traffic Engineering Design Guideline based on average seven-hour volumes.

3.2.5.3 Summary of Issues and Challenges

The intersection of Colwood Drive & West Queens Road experiences the following issues and challenges based on the analysis of existing conditions and summary of past work:

- Delay at this intersection exceeds an acceptable level of service for southbound traffic in the afternoon peak period.
- Colwood Drive provides access to Highlands Elementary School, making pedestrian safety at this intersection important.
- Existing volumes at the intersection are high enough to warrant a signal.
- On-site observations of the intersection indicated delay leading to driver impatience and aggressive driving.
- Traffic imbalance makes this intersection less suitable for a roundabout.

3.2.5.4 Opportunities

There are a number of treatments that could help address the issues outlined above. The identified improvements are based on the analysis completed by Urban. Each provides an opportunity for improvement, but comes with challenges to operations, design, and / or implementation. The treatment, opportunity, and any challenges anticipated for implementation are summarized below.

- Consider a traffic signal
 - Intersection meets the British Columbia Ministry of Transportation Warrant 2 and a traffic signal would be expected to reduce delay.
 - Expected to improve conditions on Woodbine Drive due to increased gaps in traffic on West Queens Road.
 - May encourage shortcutting on Colwood Drive when westbound traffic has a red light; however, this would be expected to be mitigated by existing traffic calming. Restricting right-turns-on-red for westbound traffic may further mitigate short-cutting. A right-turn-on-red restriction may result in enforcement issues; however, driver compliance may be increased if there are additional reasons for the restriction, including high pedestrian volumes, or the presence of on-street cycling facilities.
 - Will introduce some new delay to West Queens Road.
 - Is expected to improve crossing safety for pedestrians and cyclists.

3.2.6 Ridgewood Drive & Highland Boulevard

Highland Boulevard and Ridgewood Drive is a four-way stop intersection. Ridgewood Drive becomes Colwood Drive on the east side of the intersection. The District's Development Servicing Bylaw (2013) identifies Highland Boulevard as a minor arterial road. Ridgewood Drive is a collector road between Edgemont Boulevard and Highland Boulevard. Colwood Drive is identified as a collector road. The Bicycle Master Plan and Transportation Plan identified cycling accommodation on Highland Boulevard and Ridgewood Drive as future on-street cycling routes.



Source: Google Maps

Figure 14: Intersection of Ridgewood Drive and Highland Boulevard

3.2.6.1 Summary of Past Work

The intersection of Ridgewood Drive and Highland Boulevard has been assessed in the following recent studies:

- Bunt & Associates, Edgemont Senior Living Development Final Report, 2013

The study identified the following issues and challenges at this intersection:

- This intersection operated at a LOS 'B' or better in the afternoon peak period in 2012. (Bunt, 2013)

3.2.6.2 Traffic and Operations Analysis

The traffic and operations analysis included an assessment in Synchro, traffic signal warrant review, and summary of collisions from 2008 to 2012. Existing morning and afternoon peak hour traffic volumes for Ridgewood Drive and Highland Boulevard are shown in Figure 15.

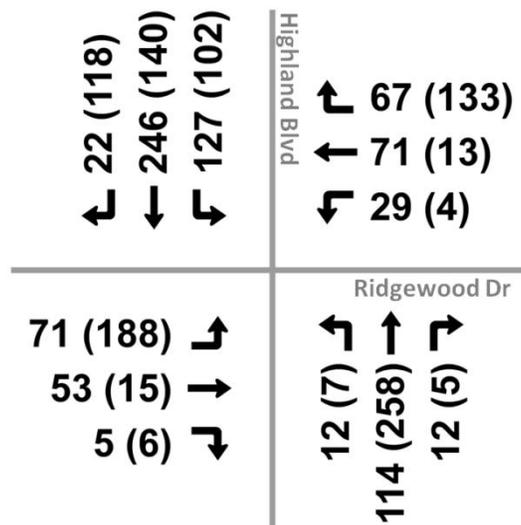


Figure 15: 2013 Traffic Volumes: Ridgewood Drive & Highland Boulevard (AM (PM))

The existing intersection configuration was analyzed in Synchro using the volumes shown in Figure 15. All movements at this intersection operated with LOS 'D' or better and v/c ratios less than 0.90 in both the morning and afternoon peak hours.

Collision data collected from ICBC from 2008 – 2012 recorded 12 reported collisions at this intersection. One of these collisions included a casualty (crash resulting in injuries - no fatalities were reported in Edgemont Village during this time period) with the remaining 11 collisions being property damage only.

This intersection did not meet the TAC Traffic Signal Warrant. The intersection was not found to meet any of the warrants tested under the British Columbia Ministry of Transportation Electrical and Traffic Engineering Design Guideline. The seven hour average of the minor street volume is on the threshold of meeting Warrant 1 and the intersection may meet this warrant in the future if traffic volumes grow due to development.

3.2.6.3 Summary of Issues and Challenges

The intersection of Ridgewood Drive & Highland Boulevard was not found to experience traffic operations or safety issues and challenges based on the analysis of existing conditions and summary of past work. The analysis identified some considerations for the future of this intersection:

- Study of this intersection did not identify any operational, delay, or safety issues. Analysis did not include a detailed safety review.

- Volumes indicate that a traffic signal may be considered here in the future if delay increases or safety becomes a concern.
- Because of relatively balanced traffic, a roundabout may also be considered in the future if property becomes available. One possible configuration of property required is shown in Figure 16. This drawing only reflects the possible scale of property required based on a 50 m diameter roundabout (including sidewalks) and is not based on roundabout design. Actual property requirements should be determined during the design phase.



Figure 16: Possible Roundabout Property Requirements – Highland Boulevard & Ridgewood Drive

3.2.6.4 Opportunities

Continue to monitor to this intersection as development occurs to determine if improvements are needed. Consider acquiring property for a roundabout.

Paisley Road & Ridgewood Drive

The District has made some recent improvements at this crossing to address issues raised by the community. These improvements include:

- Upgraded crosswalk sign and crosswalk ahead warning sign to high reflective diamond grade type signage in order to increase driver awareness of the crossing.
- Installed bright stick on crosswalk sign pole to increase driver awareness of the crossing.
- Arranged for trimming of landscaping at the intersection to provide additional sight distance.

The District conducted a pedestrian / vehicle study at the intersection of Sunset Boulevard and Ridgewood Drive on November 5, 2013 (7:40 to 8:40 am and 2:30 to 3:30 pm). The study considered sight distances, street lighting, sidewalk connections, collision history, traffic counts, and planned cycling improvements following national standards. The study indicated that a special crosswalk or signalized crossing is not warranted at this location. Studies have proven that implementing crosswalk upgrades that are not warranted can create a false sense of security at crossings and may negatively impact pedestrian safety.

Revenue from redevelopment in and around Edgemont Village could potentially enable future funding for an extension of the existing concrete pad and curb letdown at the northwest corner of the intersection, as illustrated in the picture below.

The North Vancouver Bicycle Master Plan (2012) identified Ridgewood Drive as a planned cycling route with bike lanes. The implementation of bike lanes is expected to help narrow the crossing distance and could provide some buffering and increased comfort to pedestrians. Because of the planned bike lane, curb extensions are not an option at this intersection.

Source: District of North Vancouver, November, 2013

4.0 Parking Review

Parking was identified as a major concern by residents attending public consultation events for the Edgemont Village Plan. The District completed a parking survey in 2004 and has recently developed policy considerations for parking in Centres. The parking review includes a summary of available past work, the results of parking data collection in October, 2013, a summary of current challenges, and opportunities to address existing parking issues.

As part of this review, Urban completed parking data collection in the core area of Edgemont Village on one weekday and one Saturday. Data collection included a supply survey of number of spaces and time restrictions. It also included an occupancy survey completed from 10:30 to 12:30 on Saturday, October 19, 2013 and from 10:30 to 12:30 and 3:00 to 5:00 on Wednesday, October 23, 2013.

4.1 Summary of Past Work

In 2004 the District completed a Parking Analysis in Edgemont. The survey considered both public on-street parking and private parking on the lanes. Underground parking and larger private surface lots were not surveyed. The analysis was based on data collected from September 21 to 25 in 2004. One morning and one afternoon occupancy counts were completed on each day. Morning counts began between 10:00 a.m. and 11:00 a.m. Afternoon counts began between 1:45 p.m. and 3:00 p.m. Data collected on weekdays was used to develop average weekday occupancy for the morning and afternoon time periods. Weekend occupancy was based on data collection on Saturday, September 25. The results of the District's analysis are summarized in Table 1.

Table 1: 2004 Edgemont Parking Analysis Summary

2004 Edgemont Parking Analysis Summary					
Location	Capacity	% Occupied			
		Weekday AM	Weekday PM	Weekend AM	Weekend PM
SW Lane (Highland to Crescentview)	30	60	53	43	57
NW Lane (Highland to Crescentview)	29	85	82	77	77
SE Lane (Highland to Queens)	28	77	76	67	71
NE Lane (Highland to Queens)	72	94	90	69	76
Newmarket (Highland to Crescentview)	9	78	72	100	78
Woodbine (Queens to Crescentview)	49	78	73	98	80
Canfield N	4	56	81	50	50
Canfield S	8	75	69	63	50
Edgemont (Queens to 2825)	15	70	65	60	60
Beverley (Woodbine to 3067)	8	44	66	100	100
Total	252				

Source: District of North Vancouver

The analysis found that some blocks are constrained, with occupancy greater than 85% during these periods, while others have capacity through all time periods studied. The most highly occupied blocks were Beverly Crescent during the weekend time periods and Woodbine Drive and Newmarket Drive in the

weekend morning. The northeast lane was highly occupied during the weekday, but had more spaces available on the weekend.

The District has also developed draft parking considerations with principals concerning parking in town and village centres. These principals outline how the District plans to manage on- and off- street parking in its core areas. These considerations are included in Figure 17.

District of North Vancouver Parking Principles for Centres

1. Support households choosing to own fewer cars by reducing the amount of parking supplied and introducing initiatives like car-sharing and transit pass programs.
2. Direct value that is captured from reduced parking rates to investment in community assets.
3. Consider reduced parking requirements for multifamily residential developments relative to unit type and context, in conjunction with trip reduction programs.
 - For example parking rates at approximately:
 - 1.4 stalls per unit for apartments outside Frequent Transit Development Areas.
 - 0.1 spaces per visitor.
 - Encourage developers to continue to sell parking separately from units.
 - Require unsold parking to be turned over to the strata organization.
 - Request post-occupancy survey information for new developments to inform future decisions about parking rates.
4. Continue to require sufficient, secure bicycle parking in all new developments.
5. New developments should include and/or allow for the future implementation of electric vehicle charging parking infrastructure.
6. Treat on-street and off-street parking as a system. That is:
 - Provide quality information about on- and off-street parking availability;
 - Design street networks in retail areas such that some on-street parking is available for retailers and traffic can easily circulate around the block;
 - Resident-only on-street parking is to be avoided in mixed-use centres and instead, time-restrictions are to be used as an instrument to encourage more efficient turn-over of parking stalls, and;
 - When time-restricted street parking is 80% full, consider risks and benefits of introducing parking pricing to encourage more efficient turn-over of parking stalls.
7. Encourage shared parking in commercial areas and where parking is shared by complementary land uses.

Source: District of North Vancouver, 2013

Figure 17: District of North Vancouver Parking Principles for Centres

The District has indicated that in Edgemont Village, where developments provide a comprehensive trip reduction program, parking variances to as low as 1.5 spaces per residential unit may be entertained. The District would expect that commercial parking continue to be provided at the bylaw rate.

4.2 Overall Parking Supply

The 2013 street parking supply survey found that Edgemont has around 200 private parking spaces in lanes and around 250 public on-street spaces. Private spaces may be reserved for use by customers, employees, or others. Public spaces may have time restrictions or be open at all times. The survey did not include high-turnover private spots on the gas station site, surface parking at Highlands Church, the Super Valu (known as the “Edgemont Market”), or any off-street underground parking. Parking types and restrictions in Edgemont Village based on the supply survey are illustrated in Figure 18.



Figure 18: Parking Types and Restrictions

4.3 Overall Parking Occupancy

Parking occupancy throughout the parking study area varied by time period and block. Some blocks, such as Connaught Crescent and most of the laneways, saw low to medium occupancies in all time periods. Others, such as Highland Boulevard and Edgemont Boulevard, were more than 85% occupied in most time periods and 100% occupied during the Saturday morning survey. When looking at the study area as a whole, parking was 94% occupied during the Saturday peak at 12:00 p.m. to 12:30 p.m., 80% occupied during the weekday morning peak from 11:10 a.m. to 11:50 a.m., and 75% occupied during the weekday afternoon peak from 3:00 p.m. to 3:40 p.m. These peak period occupancies are illustrated in Figure 19. More detailed illustrations of parking patterns during the morning and afternoon peaks are illustrated in Figure 20, Figure 21, and Figure 22.⁴

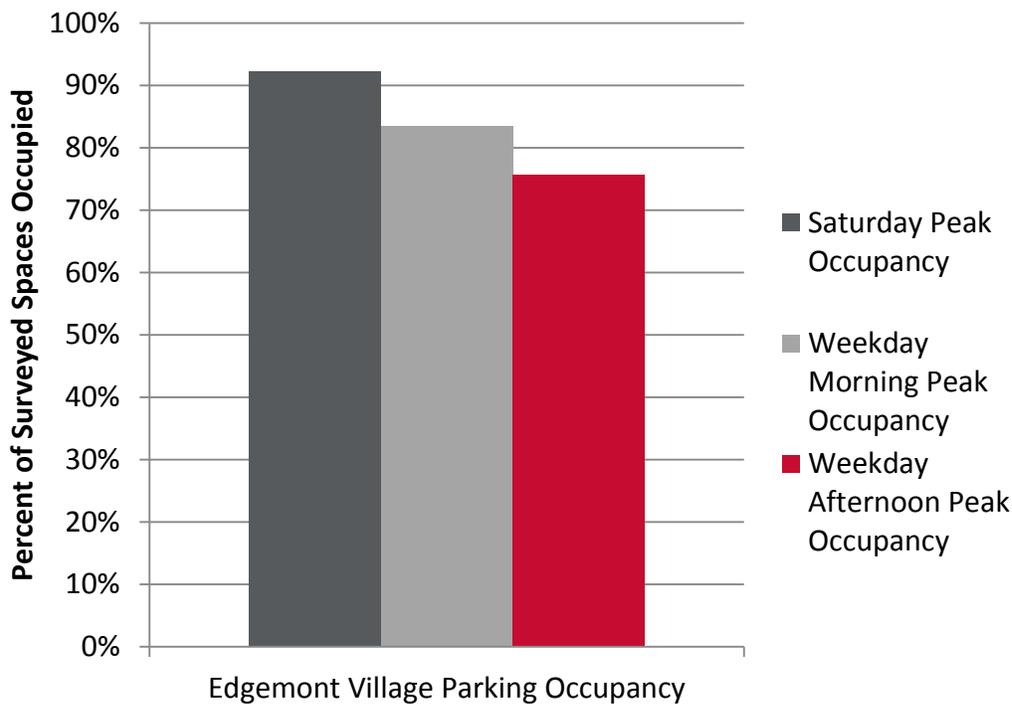


Figure 19: Peak Period Parking Occupancy for Surveyed Parking Spaces in Edgemont Village Parking Assessment Area

⁴ Based on data collected from 10:30 to 12:30 on Saturday, October 19, 2013 and from 10:30 to 12:30 and 3:00 to 5:00 on Wednesday, October 23, 2013. Occupancy for the lane between Edgemont Boulevard and Woodbine Drive south of Highland Boulevard is estimated based on joint counts of the surface lot at the corner of Woodbine Drive and West Queens Road. This lot is temporary and not part of the formal parking supply. It was assumed that vehicles parked on this lot during the survey would be relocated to the adjacent lane should that lot not be available. Occupancy for the lane is adjusted to reflect this temporary supply.

The parking illustrations show that parking demands are highest on Edgemont Boulevard, Highland Boulevard, and Woodbine Drive, while some of the streets further away from the heart of the community have more capacity, even in peak periods. This indicates drivers' preference to park close to their destination. On-street parking generally experiences the highest demand, even where off-street supply is ample. Overall, the 2013 survey showed higher occupancies than the 2004 survey; this may be because the 2004 survey did not include the parking peak in some blocks.

The following points summarize key observations about parking supply and demand in Edgemont Village:

- Within the study area, existing parking demands were observed to be the highest around noon on Saturday, with parking occupancy being about 85% of supply.
- Parking occupancy on weekdays is less constrained, with specific blocks having high occupancy while others have spaces available. Peak morning occupancy for the study area as a whole is 77% and peak afternoon occupancy for the study area as a whole is 69%.
- Parking was observed to be highly occupied on Edgemont Boulevard for all of the study periods (around 85% or higher).
- Highland Boulevard, West Queens Road, and Woodbine Drive also see high levels of occupancy on Saturdays and during weekday mornings, with lower occupancy on weekday afternoons.
- Private parking spaces accessed via the lanes are often less occupied, sometimes as low as 50%.

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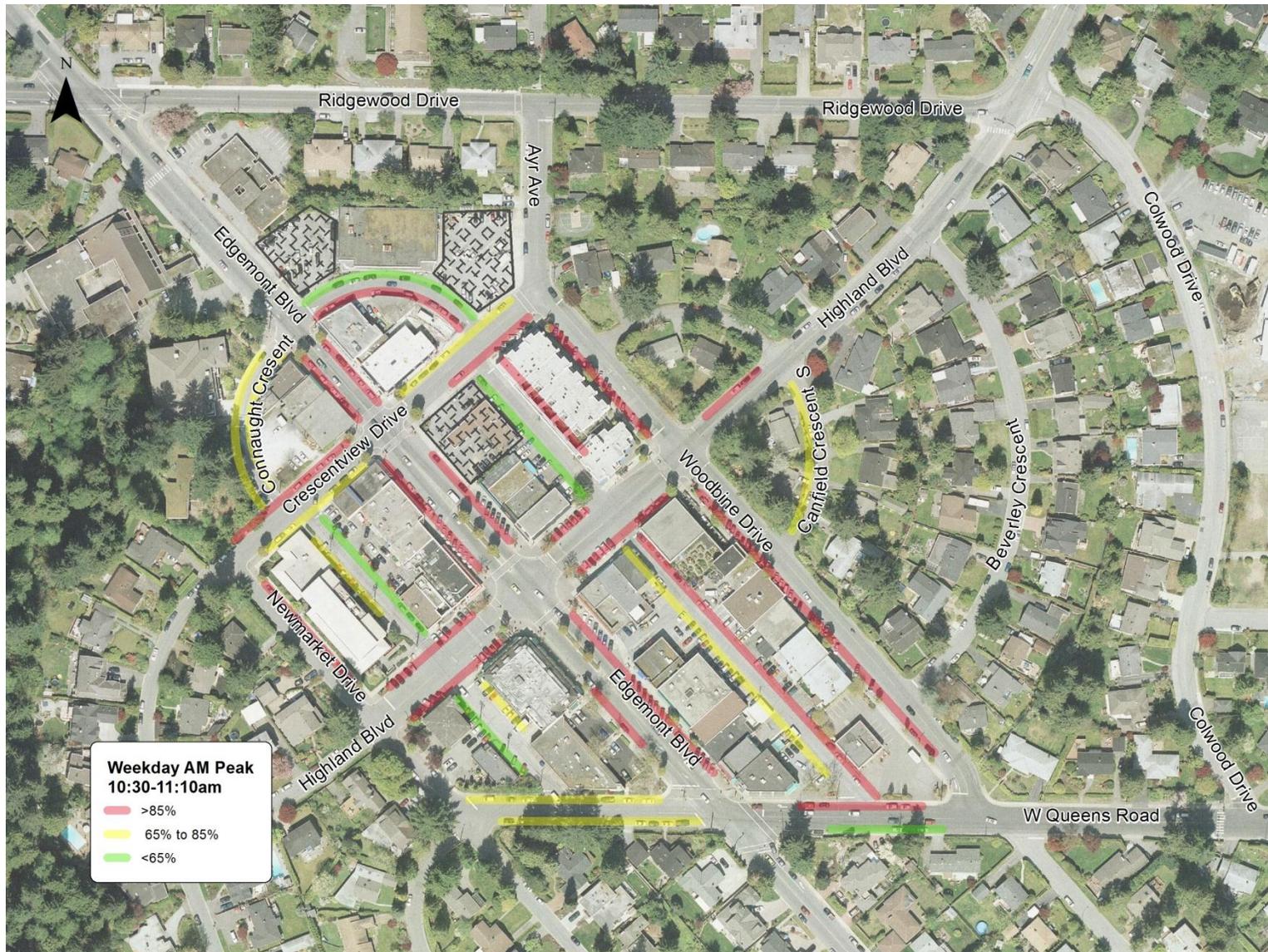


Figure 20: Weekday Morning Peak Parking Patterns



Figure 21: Weekday Afternoon Peak Parking Patterns

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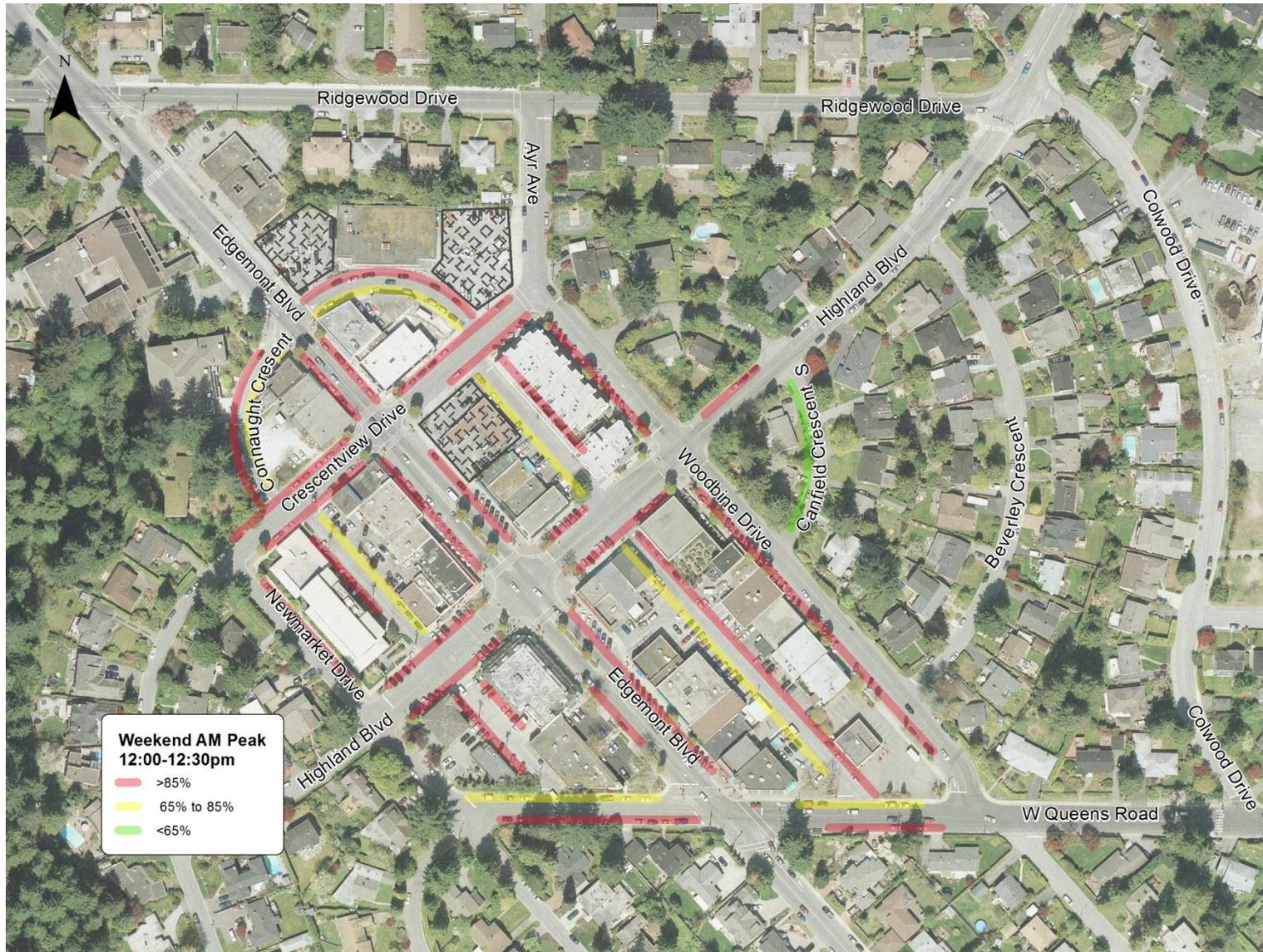


Figure 22: Weekend Mid-Day Peak Parking Patterns

4.4 Off-Street Parking Considerations

Most of the existing retail developments in Edgemont Village were built in the 1950s and were not subject to current parking bylaw requirements. As a result, some existing blocks have less private parking than would typically be required from a similar development now. The District of North Vancouver zoning bylaw requires 1 space per 45 m² of commercial floor space. The District completed an assessment of a village block (west side of Edgemont Boulevard between Highland Boulevard and Crescentview Drive) and found that existing private parking supply is 1 space per 74 m² of commercial floor space. If current District bylaw standards were applied, a building of the same size today would be required to provide 31 spaces.⁵ This is 60% more than the 19 spaces currently provided. As and when older sites with low off-street parking supplies redevelop, the District can require developers to meet current bylaw standards for commercial parking, which would increase the total number of off-street parking spaces in Edgemont Village. Recent experience in Edgemont Village and similar areas of redevelopment in the District indicates that developers may elect to provide more than the minimum parking requirement for commercial space in response to market conditions. The District has developed a list of 12 principles for underground parkade design, as described in Figure 23.

⁵ 1,405 m² of commercial floor space in this block divided by 19 spaces = 1 space per 74 m² (source: District of North Vancouver, 2013)

Principles for Underground Parkade Design

The District of North Vancouver is exploring draft principles to enhance the experience in underground parking facilities.

1. Locations of **parkade entries** should have clear signs.
2. Introduce **natural lighting, openness, and visual permeability**, as much as possible.
3. Use of art, colour, music, or other elements can **enhance the experience in the parkade**.
4. **Lighting** must be uniformly distributed to avoid dark areas with sufficient overlap of light distribution.
5. Consider using advanced technologies to provide **information on availability of parking spaces**.
6. **Exit routes** should be well-marked.
7. Design of parking facility driveways should **promote internal circulation and safety on the surrounding street network**.
8. Where possible, **orient parking aisles parallel to pedestrian desire lines**, so that pedestrians of all ages and abilities are comfortable moving between their vehicle and the destination.
9. Sight lines should provide a **clear view of surroundings**.
10. **Availability of help** should be clearly marked with signage.
11. Active security measures like alarm buttons, video cameras and security patrols in parking facilities **enhance security monitoring**.
12. **Share parking between complimentary land uses**. Designing features such as how security gates are located, can make a difference to the success of shared parking programs.



Source: District of North Vancouver, 2013; Adapted from Safety Design Guidelines for Parking Facilities, ICBC, 1998

Figure 23: Principles for Underground Parkade Design

4.5 Summary of Parking Issues and Challenges

Based on the review of past work and results of the parking survey and high-level parking assessment, parking in Edgemont Village is experiencing the following issues and challenges:

- Parking during peak times is constrained, especially on-street parking on commercial streets. On-street parking with occupancy over 85% generally results in motorists “circling” to find parking and may lead to parking on adjacent residential streets if off-street spaces are not available. Providing additional off-street capacity is unlikely to reduce demand for these key streets, as drivers will continue to prefer free on-street parking to off-street parking.

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- During the Saturday survey period, the laneways were highly occupied (>85% occupancy combined for all laneways); however, during the weekday survey periods laneway occupancy was lower than the average occupancy for Edgemont Village as a whole. The lanes have reserved spaces, meaning the spaces may only be used by employees or customers of a specific business. If these spots are not in use by the intended customers, they may be unoccupied, but not usable to other drivers.
- Occupancy levels indicate that private parking may not be fully accommodating the associated demand. Private parking should supply sufficient spaces for long-term parkers (employees, residents), as well as sufficient spaces for residential and commercial businesses. There does not appear to be sufficient off-street private parking in Edgemont Village. This is confirmed by the District's analysis, which found that many blocks have fewer spaces than would be required from redevelopment under the District's current parking bylaws.
- On-street parking brings highest value when it is used by short-term parkers to support local businesses. High levels of turnover and occupancy around 85% is desirable for on-street parking in commercial areas.

4.6 Parking Opportunities

Edgemont Village provides a good opportunity to implement some of the District's Parking Principles for Centres. These parking principles are included in the summary of past work earlier in this section. Some of these principles have high applicability to Edgemont Village and are listed below:

- Support households choosing to own fewer cars by reducing the amount of parking supplied for residential units only and introducing initiatives like car-sharing and transit pass programs.
- Continue to require sufficient, secure bicycle parking in all new developments.
 - Secure off-street long-term parking should be provided for residents in residential developments and for employees in commercial developments.
- Provide quality information about on- and off- street parking availability.
 - Provide enhanced wayfinding for off-street lots.
 - Support the installation of technology that supports monitoring and display of the number of parking spaces available in District and privately owned off-street lots.
- Design street networks in retail areas such that some on-street parking is available for retailers and traffic can easily circulate around the block.
- Resident-only on-street parking is to be avoided in mixed-use centres and instead, time-restrictions are to be used as an instrument to encourage more efficient turn-over of parking stalls.
- When time restricted street parking is 80% full, consider risks and benefits of introducing further time restrictions and / or parking pricing to encourage more efficient turn-over of parking stalls.
- Encourage shared parking in commercial areas and where parking is shared by complementary land uses. Shared parking means that parking spaces are shared by more than one use which allows parking facilities to be used more efficiently.

Further to the principles identified in the District's Parking Principles for Centres, the District has a number of opportunities to address parking issues and challenges in Edgemont Village:

- As and when redevelopment occurs, increase the number of off-street parking spaces in accordance with current parking bylaws. The District should maintain existing parking minimums and consider permitting developers to provide more parking spaces than the minimums required

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for commercial development. Variances to commercial parking rates may not be suitable for Edgemont Village. Residential parking should be provided in accordance with the rates listed in the District's Parking Principles for Centres.

- The District should work with private land owners to fully integrate the on- and off- street parking supplies. Parking way-finding for off-street lots and active parking information (i.e. number of spaces available) should be encouraged.
- Greater enforcement of existing parking time limits may increase turnover and manage occupancy; however, the most effective method for managing constrained on-street parking as a public asset is pricing. While parking is free, on-street parking on Edgemont Boulevard, Highland Boulevard, West Queens Road, Woodbine Drive, and Newmarket Drive can be expected to remain highly occupied (>85%). This is likely to be the case even if abundant off-street parking is available, because on-street parking will continue to be the highest value and most convenient. Highly occupied parking may result in traffic congestion from circling vehicles or driver frustration. Parking pricing can support local business by increasing turnover and ensuring there is always parking available on the street for customers. It is understood that the District is not considering on-street metering in Edgemont Village at this time.
- Consider further time restrictions in the busiest blocks.
- There is an opportunity to provide care share parking and electronic vehicle charging in both the public and private parking supplies. This may encourage a shift to electric vehicles and / or a reduction in vehicle ownership per household.

5.0 Transportation Input Heard at Public Consultation

Urban joined the District and other consultants at Open Houses regarding Edgemont Village on Saturday, November 2nd and Tuesday, November 5th, 2013. Residents who interacted with the team member in attendance were generally supportive of the proposed opportunities. The District has compiled a comprehensive summary of public input from the sessions. Common themes from discussions with the public are summarized below:

- Bicycle accommodation – many members of the public noted that cycling is an important mode of transportation in Edgemont Village, especially for school children and that the future transportation network should include measures to make cycling safer for all users.
- Residents expressed a preference for high on-street parking occupancy to continue if the alternative for demand management is parking pricing.

6.0 Other Transportation Considerations

A number of other transportation considerations have been identified in Edgemont Village. These are summarized below:

- Edgemont Boulevard, Highland Boulevard, and Ridgewood Drive are all identified as on-street cycling routes in the North Vancouver Bicycle Master Plan (2012). The proposed policies and design guidelines should identify these facilities as important components of the road network in Edgemont Village. It should also acknowledge that the location of nearby schools suggests the need for All Ages and Abilities (AAA) cycling facilities in and around Edgemont Village. The District should work towards the provision of these types of facilities as and when property becomes available through lane reassignment and / or redevelopment.
- Preliminary engineering and functional design for intersection improvements, including the design of curb bulges, removal of medians, etc. should prioritize pedestrians while considering bicycle, goods movement, and vehicle needs at key intersections.

7.0 Recommendations

Recommendations for intersections:

- Edgemont Boulevard & Ridgewood Drive:
 - Improve intersection control by providing either a signal or a roundabout.
 - With either a signal or roundabout, consider textured or coloured pavement treatments at the intersection
 - Install pedestrian accessibility improvements.
- Edgemont Boulevard & Highland Boulevard:
 - Improve intersection control by providing a signal.
 - Coordinate the signal with existing signal at Edgemont Boulevard & West Queens Road.
 - Consider special treatments, including a raised intersection, special pavement colour, and / or a pedestrian scramble.
 - During design of the improved intersection, consider revising approach lane widths, corner radii, presence of median, and pedestrian and cycling accommodation.
- Edgemont Boulevard & West Queens Road:
 - Add paint markings through the intersection identifying the turning path for eastbound to northbound vehicles.
 - Increase the setback from the intersection and lane to parking on the north side of West Queens Road.
 - As redevelopment occurs, remove accesses directly onto West Queens Road and consolidate accesses onto the lanes. Monitor the effects of currently planned improvements on operations and safety over the next five to ten years.
- Woodbine Drive & West Queens Road:
 - As redevelopment occurs, consider realigning intersection.
 - Restrict on-street parking on West Queens Road near this intersection.
 - Trim the shrubbery on the northeast corner.
- Colwood Drive & West Queens Road:
 - Install a signal with a right-turn-on-red restriction for westbound traffic.
- Ridgewood Drive & Highland Boulevard:
 - Continue to require that developers in the area consider potential impacts to Ridgewood Drive & Highland Boulevard.

Recommendations for parking:

- Invest in greater enforcement of existing parking restrictions.
- As and when redevelopment occurs, require developers to provide the minimum amount of commercial parking required by bylaw.
- Work with owners of off-street parking to improve wayfinding and parking information and to design parkades that align with the District's Principles for Underground Parking Design.
- Continue to work with other organizations to enhance alternatives to driving, including transit supply, car-share, cycling infrastructure, and transit pass programs.
- Consider further time restrictions on streets where parking is more than 80% full.
- Consider providing electric vehicle charging and / or care share parking in the public parking supply and encouraging private parking owners to do the same.

8.0 Conclusion

The technical analysis conducted by Urban Systems confirmed residents' insights into both intersection and parking challenges. Some key intersections operate below acceptable standards for capacity and delay and parking occupancy is high during peak times. The District has a number of opportunities to address these challenges as redevelopment occurs.