

Onni Group of Companies

**TRANSPORTATION STUDY FOR THE PROPOSED DEVELOPMENT AT
13TH STREET/LONSDALE, CITY OF NORTH VANCOUVER, BC**

FINAL REPORT

OCTOBER 10, 2012



DOCUMENT CONTROL

| | |
|-------------------|---|
| Client: | Onni Group of Companies |
| Project Name: | Transportation Study for the Proposed Development at 13 th St/Lonsdale, North Vancouver, B.C. |
| Report Title: | Transportation Study for the Proposed Development at 13th Street/Lonsdale, CITY of North Vancouver, BC |
| IBI Reference: | VO-29039 |
| Version: | Final |
| Digital Master: | j:\29039_lonsdaletraf\10.0 reports\ttr_lonsdale_13st_tia_v12_2012-10-10.docx |
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| Authorization: | Homayoun Vahidi |
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| History: | <ul style="list-style-type: none">- Draft Report Submission May 6, 2011- Revised Draft Report Submission June 21, 2012 |
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1. INTRODUCTION

Onni Group of Companies is planning to construct a mixed-use residential and commercial development in the northeast corner of the intersection of 13th Street/Lonsdale Avenue in the City of North Vancouver, B.C. The location of the site in the context of North Vancouver is shown in Exhibit 1.1 whilst an aerial view of the site and surrounds is given in Exhibit 1.2.

The subject site covers a number of parcels including the existing Safeway site at 130 East 13th Street, and other retail developments at 1308 Lonsdale Avenue, 117 East 14th Street and at 133 East 14th Street. The Safeway building is adjacent to 13th Street, and there are two smaller retail stores fronting 14th Street and a public parking lot in the southwest corner of the site.

The subject land parcels, shown in Exhibit 1.3, are to be consolidated and redeveloped for a high-density mixed use residential, retail and office development. Based on the current plan, the development will consist of 344 dwelling units in two high-rise towers, approximately 9,010 m² (97,000 ft²) of retail/commercial space, and 7,340 m² (79,000 ft²) of office space. Vehicular access is proposed from 13th Street west of St. Georges Avenue and also from 14th Street via an existing north-south lane. For the purpose of analysis, the entire development was assumed to be completed by the end of 2014.

This study examines the current and future operations of the surrounding road network to determine what improvements, if any, may be required to accommodate background traffic volumes. Also examined is the operation with the future site generated traffic in place. Improvements required to mitigate the likely effects of this additional site traffic are identified. The goal is to ensure that once the site traffic is in place, intersections and roadways around the site operate as well as, or at least no worse than, they did without the incremental site traffic added on. The work undertaken, the findings and the conclusions are summarized in this report.

Walk, Bike and Transit Use

In addition to traffic impact analysis, the study also seeks to identify measures/strategies to reduce reliance on automobiles and promote non-vehicular trips, i.e., walk, bike and transit use.

The site is located in an urban environment, amidst numerous retail, commercial, healthcare and various other amenities. This presents an opportunity to create a sustainable high-density neighbourhood that promotes non-vehicular modes of travel, i.e., walk, bike and transit. The following features of the development or the area are expected to reduce the reliance on vehicles:

- Access and circulation is the backbone of the proposed layout, enabling intuitive and simple access for pedestrians and cyclists both within and beyond the perimeter of the site.
- The subject area is served by a number of transit routes and just over a kilometre away from a multi-modal transit hub, Lonsdale Quay.
- The site is adjacent to a bike route (13th Street) and a future Greenway link (14th Street). It is also within a block of two primary north-south bike routes, Chesterfield and St. Andrews.
- Secure bike parking, storage, shower and change facilities are proposed, which will encourage bike use for the residents, visitors and employees at this site.
- Transportation Demand Management measures has been applied to reduce single occupancy vehicle use.

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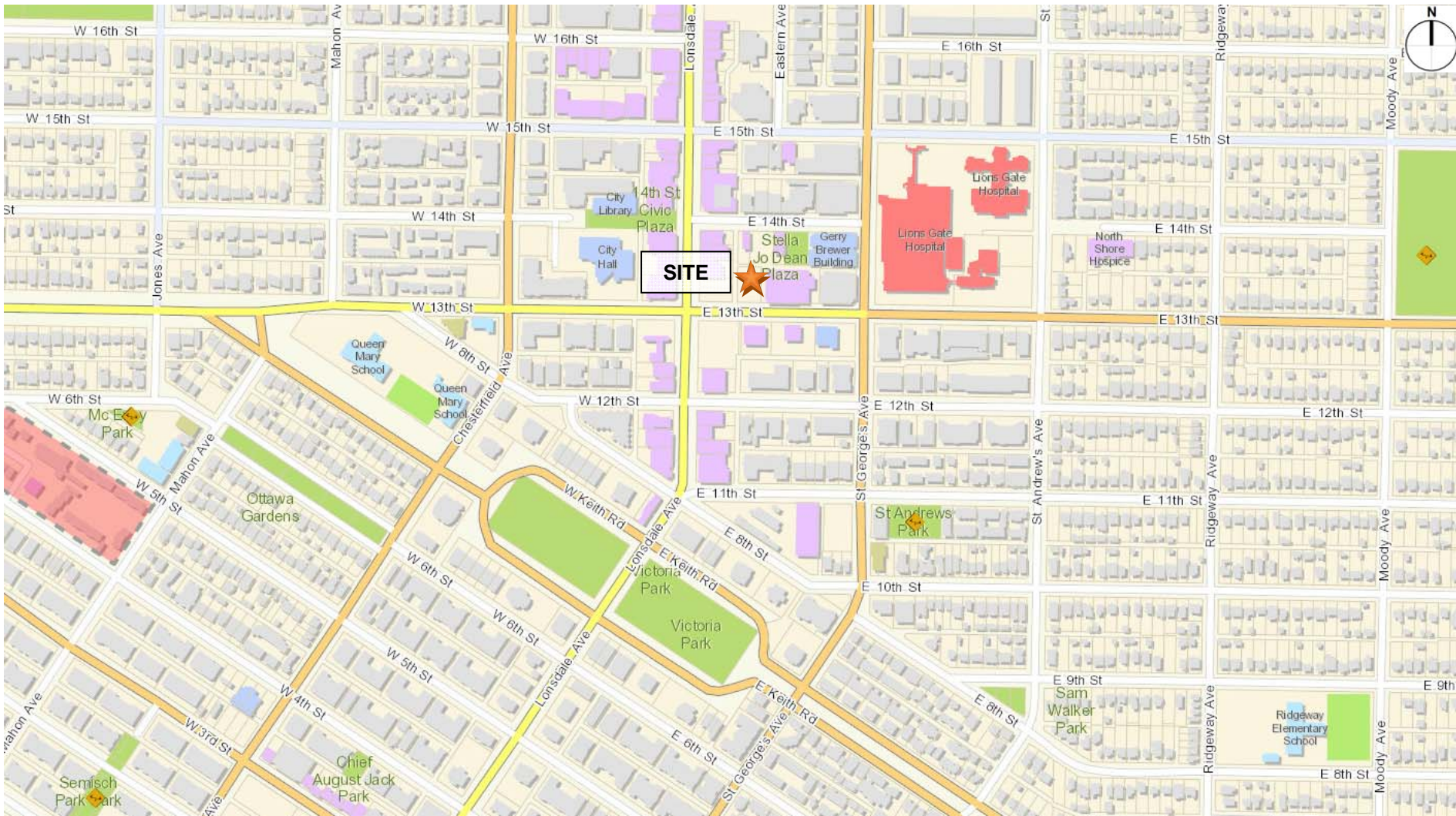
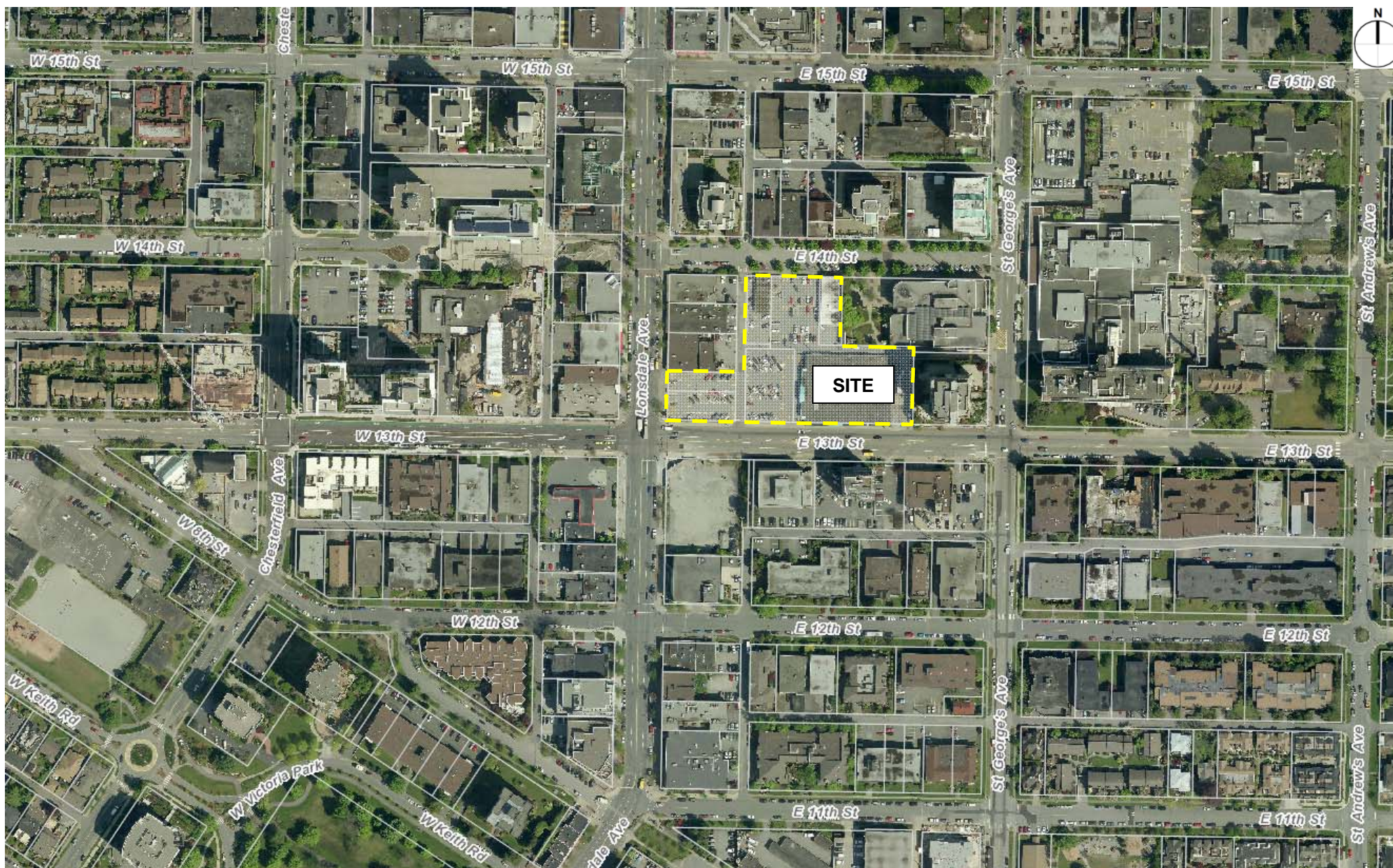
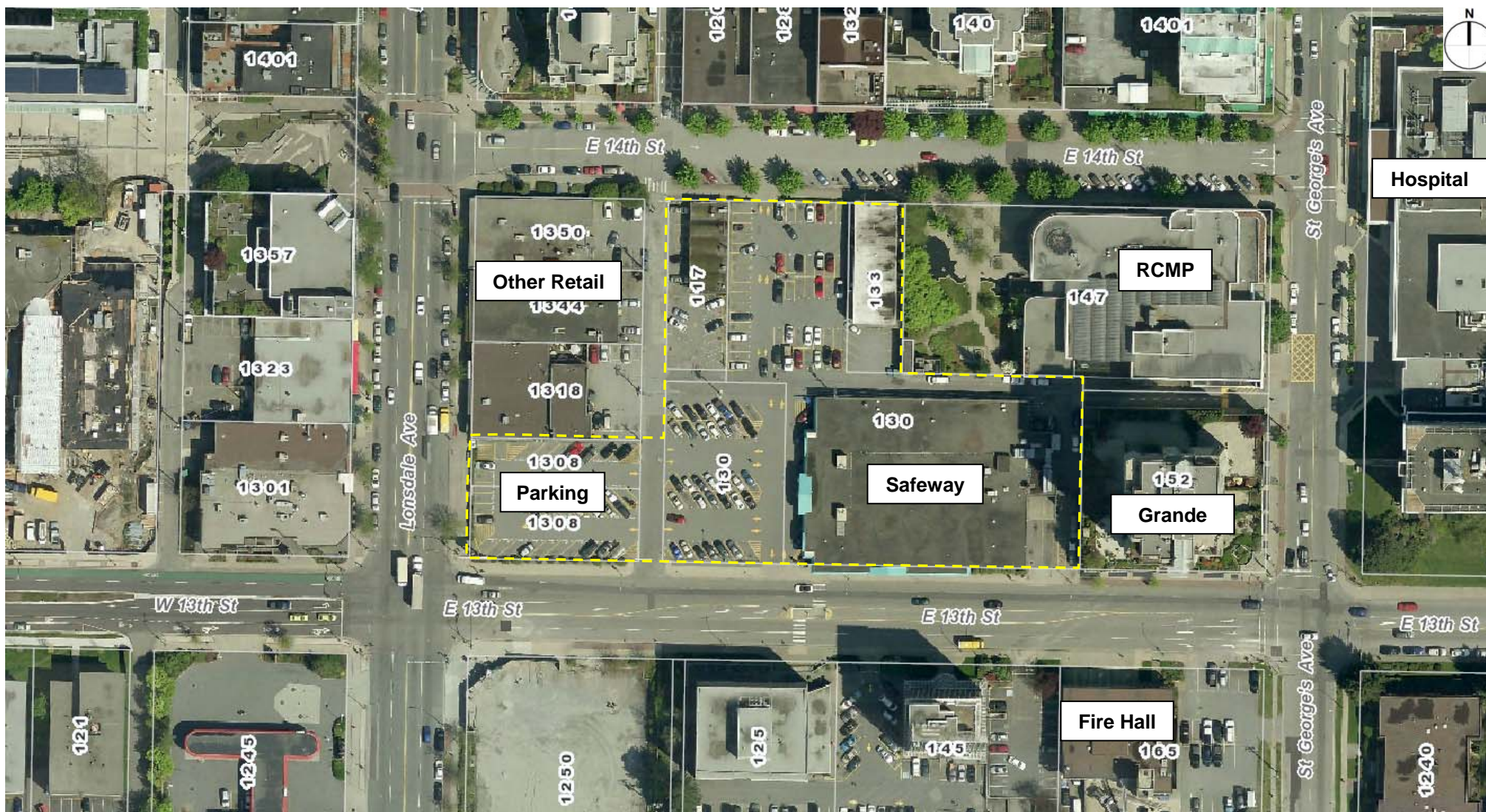


EXHIBIT 1.1
SITE LOCATION





2. BACKGROUND TRAFFIC CONDITIONS

2.1 Road Network

The road network and associated traffic control in the vicinity of the site is shown in Exhibits 2.1.1 and 2.1.2. All the roads relevant to this study have a typical urban cross-section. This includes:

- 13th Street, an arterial with running east-west along the southern perimeter of the site;
- Lonsdale Avenue, a major network road running north-south, along the western perimeter;
- 14th Street, a local road running east-west along the north side of the site, it is one-way eastbound between a North-South Lane east of Lonsdale Avenue and St. Georges Avenue;
- St. Georges Avenue, another north-south road a short distance to the east of the site;
- North-South Lane, a public lane running parallel to and approximately 50 metres east of Lonsdale Avenue, as measured between the nearest pavement edges; and
- An east-west private lane running parallel to and 45 metres north of 13th Street providing access to the subject site and a residential/commercial tower to the immediate east.

Table 2.1 provides information on the existing roads in the vicinity of the site. In conjunction with this development the North-South Lane is proposed to be closed just north of 13th Street. Access will be retained via north end of the lane at 14th Street. An agreement has been made with the development on the immediate east to retain a short segment of the east-west private lane. This will allow garbage collection operations for the adjacent The Grande tower using the lane.

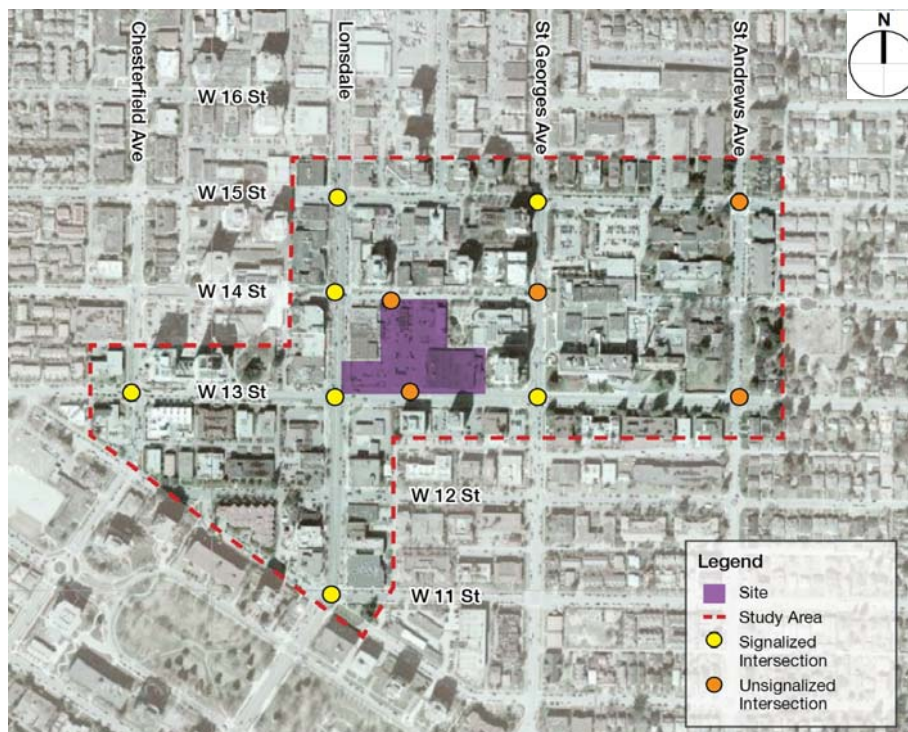
Table 2.1: Existing Key Roads near Site

| Road | Classification | Laning | Pavement | Sidewalk/ Curb/Gutter | Intersection Spacing | Parking |
|--------------------------|-------------------------|---|--------------|--------------------------|-------------------------|---|
| Lonsdale Ave | Major Road Network | 2 travel lanes each way | 19.3 m | yes | 120 m | Yes |
| 13 Street | Major Arterial | 1 lane each way east of St Georges, 2 each way adjacent site & west of Jones Ave + turn lanes | 16.2 m | yes | 230 m | yes (south side between Lonsdale & Chesterfield, between St Georges & St Andrews) |
| 14 Street | Local | 2 lanes | 13.5 m | yes | 230 m | Yes, angled on the south side site adjacent |
| 15 Street | Collector | 2 lanes | 13 m | yes | 230 m | Yes |
| St Georges Ave | Minor Arterial | 2 lanes & 4 lanes south of 14 Street | 12.8-13.5 m | yes | 120 m | Yes |
| St Andrews Ave | Local | 2 lanes | 12-12.4 m | yes | 120 m | Yes |
| <i>Existing N-S Lane</i> | <i>Public Lane</i> | <i>2 lanes</i> | <i>6.0 m</i> | <i>no</i> | <i>n/a</i> | <i>no</i> |
| <i>Existing E-W Lane</i> | <i>Private Driveway</i> | <i>2 lanes</i> | <i>5.2 m</i> | <i>no</i> | <i>n/a</i> | <i>no</i> |

Exhibit 2.1.1: Existing Road Network



Exhibit 2.1.2: Existing Traffic Control



2.2 Intersection Configuration and Traffic Controls

The City requested a total of 11 intersections to be analyzed in this study. Table 2.1 provides a summary of the existing laning configuration and traffic control at each of these intersections. This is also illustrated in Exhibit 2.1.2.

Of the selected 11 intersections, seven are signalized and the remaining four are presently unsignalized with stop-control on the minor road approaches. Four of the signalized intersections are along Lonsdale Avenue at 11th Street, 13th Street, 14th Street and 15th Street. The remaining ones are on St. Georges Avenue at 13th Street and 15th Street, and at Chesterfield Avenue/13th Street.

Two of the unsignalized intersections are on St. Andrews Avenue at 13th Street and 15th Street, and also at the intersections of 14th Street/St. Georges Avenue, and 14th Street/North-South lane.

Table 2.2: Existing Intersection Configuration

| Intersection | Traffic Control | Eastbound | | | Westbound | | | Northbound | | | Southbound | | |
|----------------------------|-----------------|-----------|---|---|-----------|---|---|------------|---|---|------------|---|---|
| | | L | T | R | L | T | R | L | T | R | L | T | R |
| 13 Street/Chesterfield Ave | Signalized | 1 | 2 | < | 1 | 2 | < | > | 1 | 1 | > | 2 | < |
| 11 Street/Lonsdale Ave | Signalized | | | 1 | > | 1 | < | > | 2 | < | > | 2 | < |
| 13 Street/Lonsdale Ave | Signalized | 1 | 2 | < | 1 | 1 | 1 | > | 2 | 1 | > | 2 | < |
| 14 Street/Lonsdale Ave | Signalized | | | | 1 | | < | | 2 | < | > | 2 | < |
| 15 Street/Lonsdale Ave | Signalized | > | 2 | < | > | 2 | < | > | 2 | < | > | 2 | < |
| 13 St/St. Georges Ave | Signalized | 1 | 1 | 1 | | 1 | < | > | 2 | < | > | 2 | < |
| 14 St/St. Georges Ave | Unsignalized | 1 | | 1 | | | | 1 | | | 1 | | |
| 15 St/St. Georges Ave | Signalized | > | 1 | 1 | > | 1 | < | > | 1 | 1 | > | 1 | 1 |
| 13 St/St. Andrews Ave | Unsignalized | > | 1 | < | > | 1 | < | > | 1 | < | > | 1 | < |
| 15 St/St. Andrews Ave | Unsignalized | > | 1 | < | > | 1 | < | > | 1 | < | > | 1 | < |
| 14 Street/N-S Lane | Unsignalized | > | 1 | < | | | | > | 1 | < | > | 1 | < |

L=Left, T=Through, R=Right, < or > indicates no separate turn lane is provided, shared with adjacent through lane

2.3 Existing Traffic Volumes

The 2012 existing traffic volumes for the key intersections in the vicinity of the site for the weekday p.m. peak hour and Saturday mid-day peak hour were established based on recent traffic count data. The City of North Vancouver provided traffic counts for four of these intersections, as presented in Appendix A. IBI Group carried out supplemental counts at the remaining intersections. Traffic counts were undertaken during the weekday p.m. peak hour (between and 4:45 and 5:45 p.m.) and Saturday mid-day peak hour (between 12:45 p.m. and 1:45 p.m.). The peak hours were identified based on an analysis of the available count data.

The 2010 traffic counts were factored up assuming a growth rate of 0.5% per annum to estimate the 2012 volumes. Exhibit 2.2 illustrates the resulting 2012 existing volumes for the selected intersections in the p.m. and Saturday peak hours.

2.4 Future Background Traffic Volumes

This study considers background traffic conditions for the 2014 opening year and a 10-year horizon of 2024. The background traffic volumes for 2014 and 2024 were estimated in two steps. Firstly, the existing site traffic volumes were subtracted from the 2012 existing volumes to obtain the “base” volumes without any site traffic. The base volumes were then factored up by an annual growth rate of 0.5% to each of the two horizon years. The existing site traffic was then added back to obtain the 2014 and 2024 background volumes including the existing site traffic. The existing site traffic volumes are shown in Exhibit 2.3. Traffic volumes at the existing site accesses were obtained from traffic counts. The site traffic was distributed along the key routes based on the expected trip distribution and at intersections based on existing turning movement volumes. The existing background traffic related to stores in the northwest corner of the site (1350, 1344 and 1318 Lonsdale Avenue) was retained on the North-South lane, which accounts for 40 vehicles in the peak hour. The redeveloped site will not include public parking and the non-site traffic is not expected to access this site. The remaining small volume of non-site traffic that currently uses the North-South lane will be rerouted to alternative routes and be spread over the road network. The incremental volume of rerouted traffic added to any individual turning movement will be less than 10 vehicles and will be within day-to-day traffic variations experienced at intersections. No specific treatment was therefore necessary for the low volume of remaining traffic.

The 2014 and 2024 background volumes assume no changes to the existing Safeway site. The City's projected traffic growth for this area is 0.5% per annum. This growth rate was considered for the purpose of analysis.

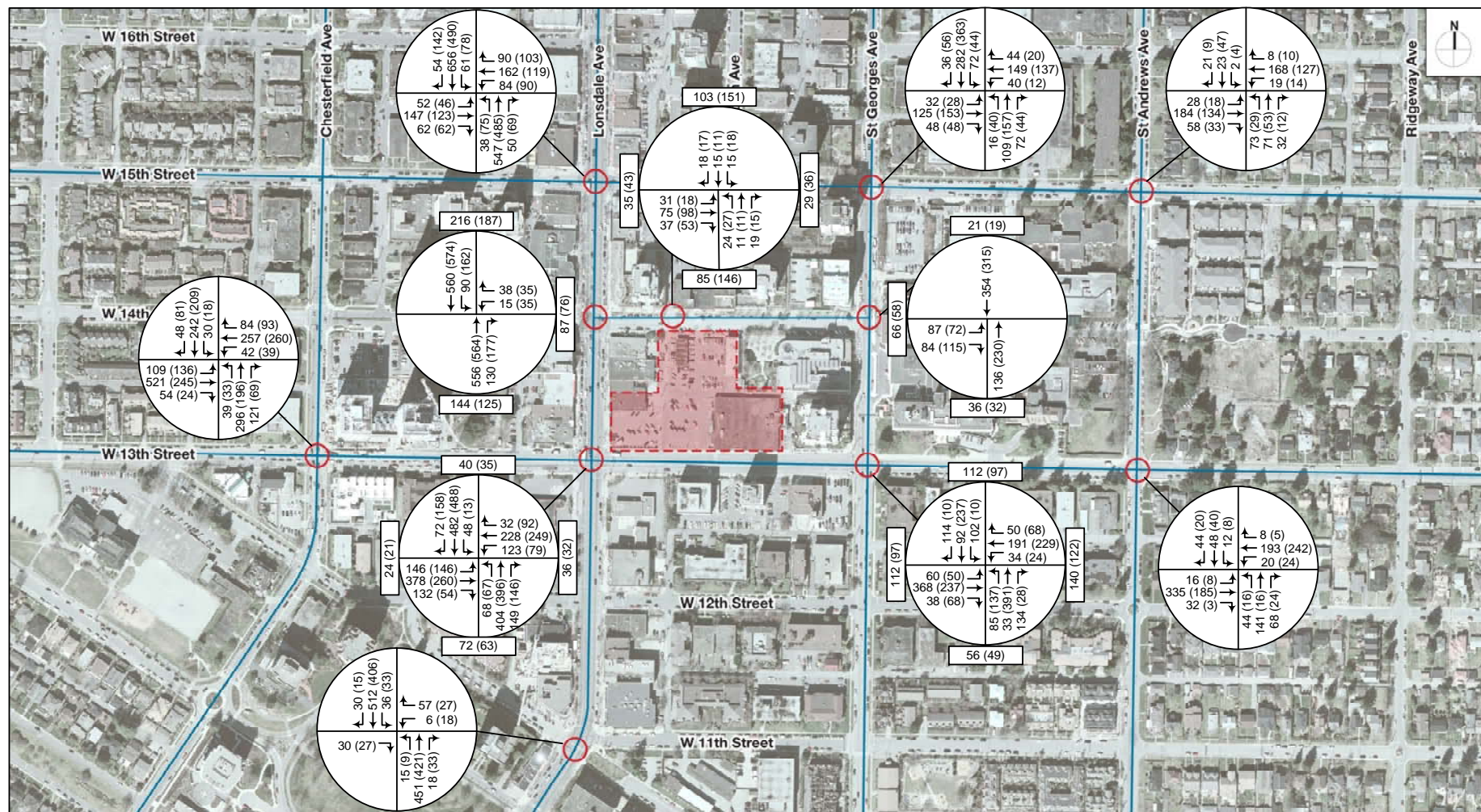
The City requested two other developments approved in the general area be taken into account in preparing future traffic projections. This includes a mixed-use development in the southeast corner of 13 Street/Lonsdale Avenue previously occupied by a gas station and modifications to the Lions Gate Hospital site in the northeast corner of 13 Street/St Georges Avenue. IBI Group prepared the traffic and parking report for the hospital site in 2009 and this information is readily available. Similar information was not available for the other development. Information available online indicates the development is to consist of a North Shore Credit Union offices with 5,570 m² floor space and 84 condominium units. Based on the Institute of Transportation Engineers' trip rates, this development is estimated to generate less than 150 vehicles in the peak hour at build-out. These trips will be spread over the surrounding road network and in the inbound and outbound directions of travel. With Transportation Demand Management (TDM) measures in place, the resulting increase in background volumes at the selected intersections are expected to be low.

No specific information was available on access, trip generation and distribution for the nearby development. Given the small increase expected due to the new development, a higher growth rate of 1.0% per annum was applied between 2012 and 2014 as a simplified approach. The higher growth factor was applied to the 2012 existing volumes excluding the existing site traffic to obtain the 2014 “base” volumes. Beyond 2014, the City's suggested growth rate of 0.5% per annum was applied to estimate 2024 “base” volumes. The existing site traffic volumes were added to the 2014 and 2024 “base” volumes to obtain the background volumes for the two years. The background conditions therefore assume no changes to the existing site.

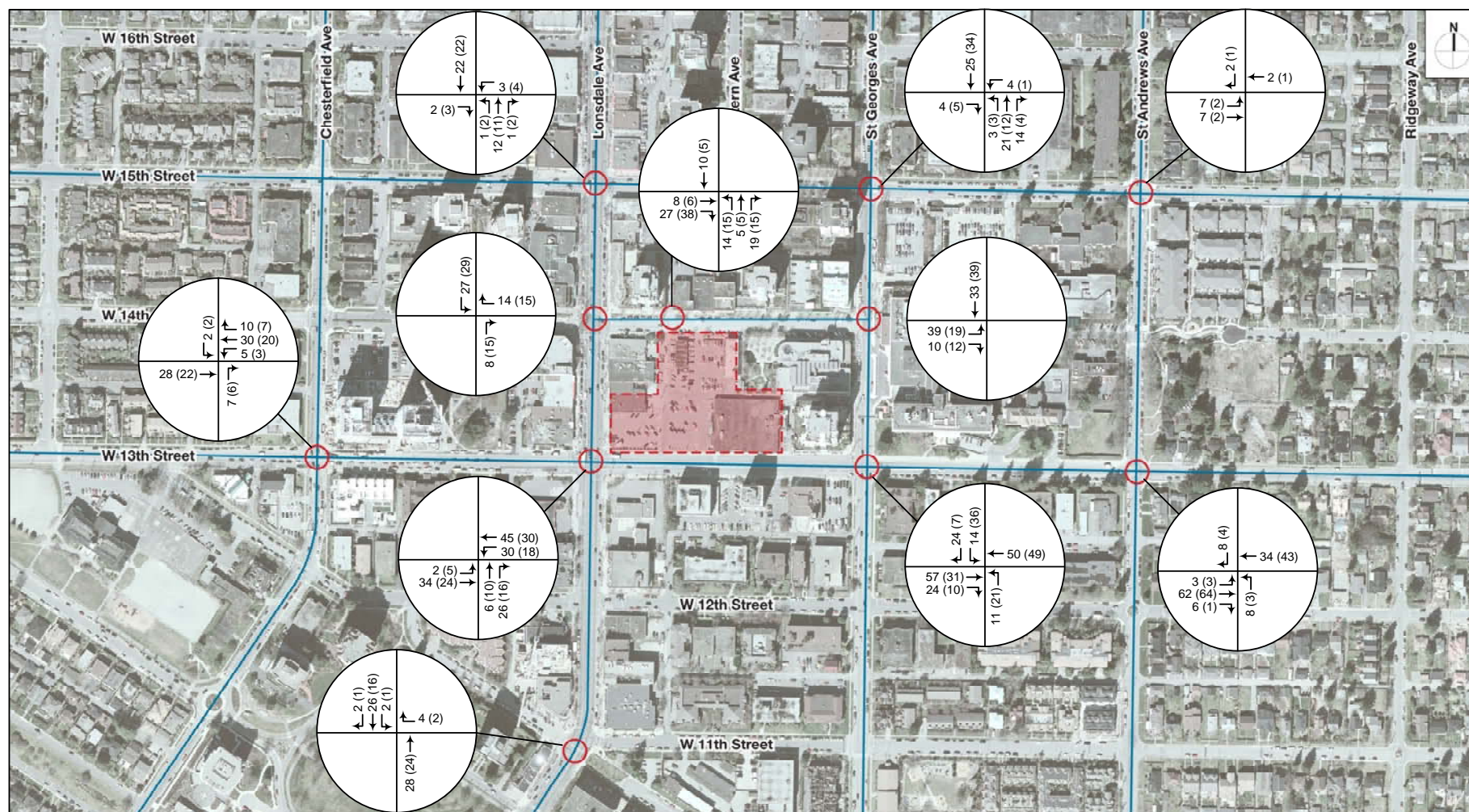
The resulting background traffic volumes in the p.m. and Saturday peak hours for the 2014 and 2024 horizon years are presented in Exhibits 2.4 and 2.5, respectively.

2.5 Intersection Analysis - Background Traffic

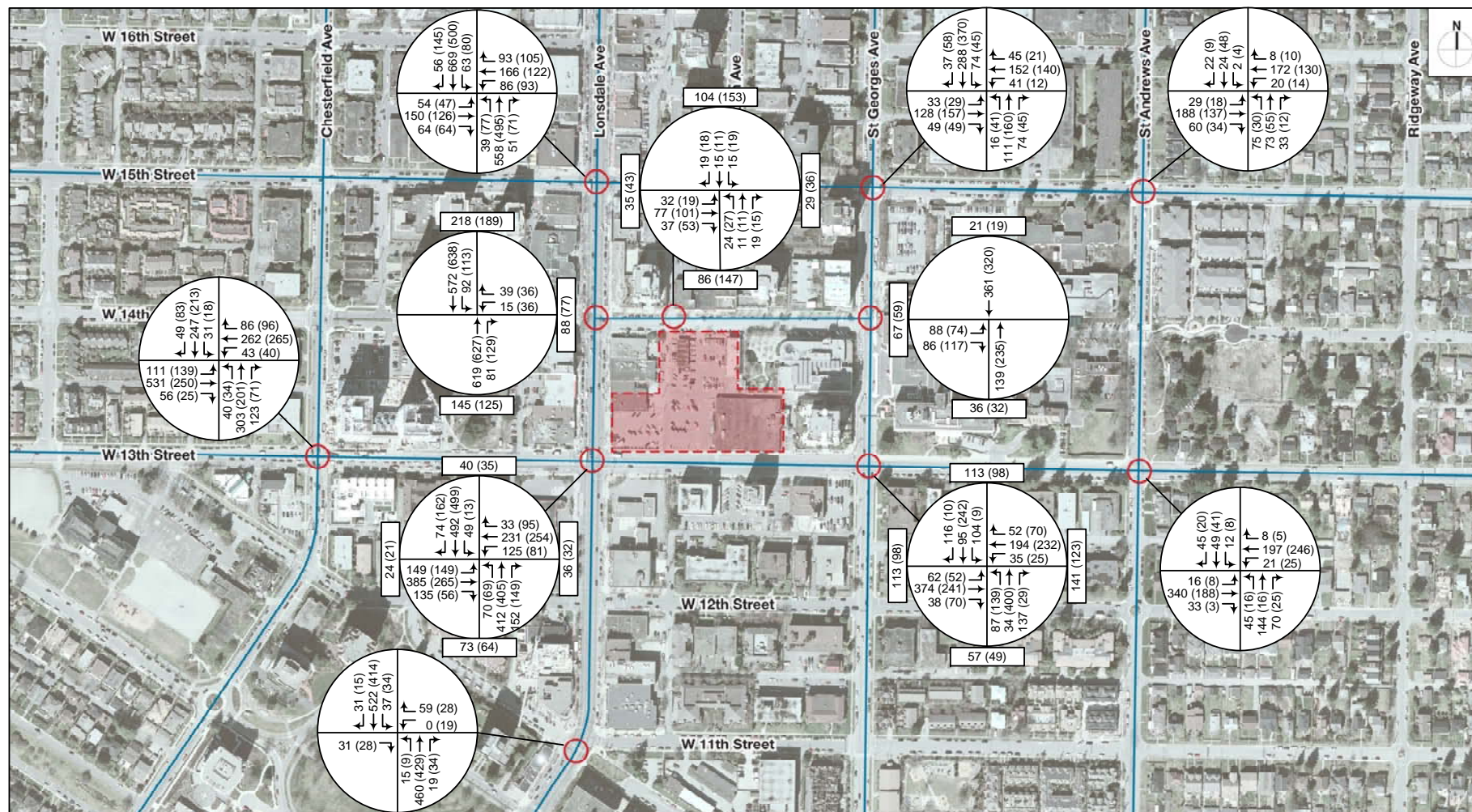
The peak hour operational performance of the selected intersections was analyzed applying the *Highway Capacity Manual* methods. For signalized intersections, the operational analysis



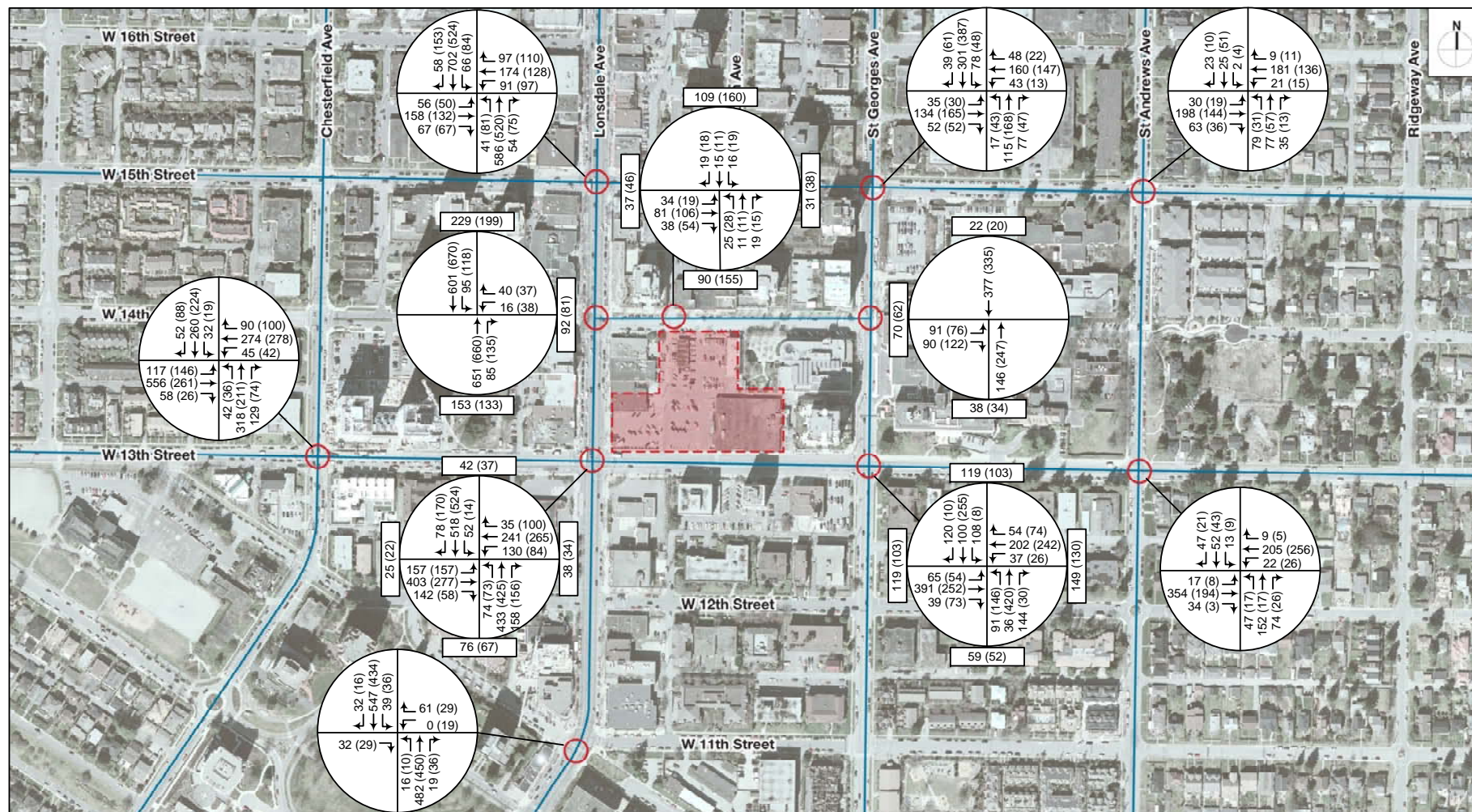
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| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes</p> <p>(xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>xxx (xxx): Pedestrian Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client:</p> <p>Onni</p> | <p>Proposed Mixed-Use Development, North Vancouver</p> |
| <p>IBI GROUP</p> | | <p>Exhibit 2.2 2012 Existing Traffic Volumes</p> <p>Project No. 29039</p> |



| | | |
|--|--|---|
| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes (xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client: Onni</p> <p>IBI GROUP</p> | <p>Proposed Mixed-Use Development, North Vancouver</p> <p>Exhibit 2.3 Existing Site Traffic Volumes</p> <p>Project No. 29039</p> |
|--|--|---|



| | | |
|--|-----------------------------------|--|
| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes</p> <p>(xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>xxx (xxx): Pedestrian Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client:</p> <p>Onni</p> | <p>Proposed Mixed-Use Development, North Vancouver</p> |
| <p>IBI GROUP</p> | | <p>Exhibit 2.4 2014 Background Traffic Volumes</p> <p>Project No. 29039</p> |



methodology gives three indicators for the overall performance of an intersection and for the individual turning movements. The first is the volume to capacity ratio (v/c) where the volume is the number of vehicles wishing to make a certain movement, and capacity is the maximum number of vehicles that can be accommodated in an hour. This takes into account the number of lanes available for the movement, whether the movement is protected or permitted, conflicting traffic, the cycle length, and the amount of green time the movement receives. The higher the v/c ratio, the more congested the intersection becomes. When the v/c ratio is greater than 1.0, this indicates that more vehicles wish to make a given movement than are able to based on available capacity. The second measure, the average delay per vehicle, is based on the cycle length, the green time for each movement and the v/c ratios. The third measure is the level of service which is established from the average delay. The larger the average delay - and the higher the v/c ratio - the worse is the level of service. **Table 2.4** shows the relationship between level of service and average per vehicle delay.

Table 2.4: Intersection Level of Service vs. Delay

| ----- Signalized Intersection ----- | | ----- Unsignalized Intersection ----- | |
|-------------------------------------|--------------------|---------------------------------------|---------------|
| LoS | Avg. Delay (s/veh) | Delays | Avg. Delay |
| A | ≤ 10 | Little or no delays | ≤ 10 |
| B | > 10 and ≤ 20 | Short traffic delays | > 10 and ≤ 15 |
| C | > 20 and ≤ 35 | Average traffic delays | > 15 and ≤ 25 |
| D | > 35 and ≤ 55 | Long traffic delays | > 25 and ≤ 35 |
| E | > 55 and ≤ 80 | Very long traffic delays | > 35 and ≤ 50 |
| F | > 80 | Failure | > 50 |

The generally accepted guideline to determine whether or not a signalized intersection needs to be upgraded is that all individual movements should operate with a v/c ratio of 0.90 or less. If these thresholds are not achieved, any signal changes required to achieve these levels should be identified. These cover changes to signal timings and phasing, for example adding advanced phases for left turn movements and possible elimination of certain turning movements, but not the provision of additional capacity with extra through or turn lanes.

When traffic generated by a development is added to an intersection and the v/c ratio of a specific movement that was less than 0.90 under background conditions is now greater than 0.90, then improvements must be identified to allow the movement to operate at 0.90 or less. If the movement was above 0.90 under background conditions, then the original v/c ratios must not be exceeded, i.e., the operation of the movement must be no worse as a result of the development.

The performance of unsignalized intersections was also reviewed using the methodology for such intersections in the *Highway Capacity Manual*. The methodology estimates the capacity of each movement based on the conflicting pedestrian and traffic volumes. An operational level of service is assigned to the movement based on the volume and capacity and the relationship between the two was included in **Table 2.4**.

While the overall level of service and delay for an unsignalized intersection provide a measure of overall performance, it is commonly turning movements at such intersections which are the primary focus of interest. With only low turning volumes from the minor road and high through volumes on the main road, delays to turning vehicles can become excessive. As delays increase, turning vehicles will attempt to turn across unacceptable gaps which can present safety concerns.

The selected intersections were analyzed based on the existing intersection channelization, signal phasing, and cycle lengths under background traffic volumes for the 2014 and 2024 horizon years and p.m. and Saturday peak hours using the *Highway Capacity Manual* methods as implemented in

Synchro 8.0. A summary of the results is presented in Table 2.5 and the results for each intersection are given in the appendix.

As shown in Table 2.5, all 11 intersections perform satisfactorily in both p.m. and Saturday peak hours in the 2014 horizon year. The signalized intersections also operate well in the 2024 horizon year with minimal change in the performance between 2014 and 2024. Overall, the Level of Service (LoS) is expected to remain satisfactory at LoS C or better with the volume/capacity (v/c) ratios of 0.74 or better in both the p.m. and Saturday peak hours. The only exception is the unsignalized 13th Street/St. Andrews intersection where the stop-controlled south leg operates at LoS E or F, according to Synchro results. Given the low volume of traffic and also as there are alternative routes available via a traffic signal, no improvements are considered necessary.

Table 2.5: Summary of Intersection Performance – Background Traffic

| Intersection | Peak Hour | 2014 | | | 2024 | | |
|----------------------------|-----------|------|-------|------|------|-------|------|
| | | LoS | Delay | v/c | LoS | Delay | v/c |
| 13 Street/Chesterfield Ave | PM | B | 11 | 0.61 | B | 11 | 0.64 |
| | SAT | A | 9 | 0.47 | A | 10 | 0.49 |
| 11 Street/Lonsdale Ave | PM | B | 12 | 0.43 | B | 12 | 0.45 |
| | SAT | B | 11 | 0.33 | B | 12 | 0.35 |
| 13 Street/Lonsdale Ave | PM | B | 13 | 0.56 | B | 14 | 0.59 |
| | SAT | B | 12 | 0.54 | B | 12 | 0.57 |
| 14 Street/Lonsdale Ave | PM | A | 8 | 0.56 | A | 8 | 0.60 |
| | SAT | B | 11 | 0.69 | B | 12 | 0.74 |
| 15 Street/Lonsdale Ave | PM | B | 12 | 0.62 | B | 13 | 0.66 |
| | SAT | B | 13 | 0.63 | B | 13 | 0.67 |
| 13 Street/St. Georges | PM | B | 13 | 0.58 | B | 14 | 0.60 |
| | SAT | B | 16 | 0.61 | B | 16 | 0.65 |
| 15 Street/St. Georges | PM | B | 11 | 0.58 | B | 11 | 0.60 |
| | SAT | B | 10 | 0.51 | B | 11 | 0.62 |
| 13 Street/St. Andrews | PM | E | 42 | 0.77 | F | 56 | 0.86 |
| | SAT | B | 14 | 0.16 | B | 14 | 0.16 |
| 15 Street/St. Andrews | PM | C | 21 | 0.46 | C | 23 | 0.50 |
| | SAT | B | 14 | 0.20 | B | 14 | 0.21 |
| 14 Street/St. Georges | PM | C | 16 | 0.23 | C | 17 | 0.25 |
| | SAT | C | 17 | 0.20 | C | 17 | 0.21 |
| 14 Street/N-S Lane | PM | B | 13 | 0.11 | B | 13 | 0.12 |
| | SAT | C | 15 | 0.14 | C | 16 | 0.15 |

LoS= Level of Service, Delay=average delay in seconds per vehicle; v/c ratio=volume to capacity ratio; overall intersection for signalized and the worst movement for unsignalized intersections

2.6 Land Use

An aerial photograph showing the subject site and surrounding environs is presented in **Exhibit 1.3**. The site covers five adjacent parcels that presently accommodate a Safeway building at 130 13th Street, and two smaller commercial retail buildings at 117-119 and 133 14th Street. The building at 117-119 14th Street in the northwest corner is currently vacant while the other accommodates a pet foods store. At 1308 Lonsdale Avenue, in the southwest corner of the site, is a public pay parking where Safeway customers can park for free for up to an hour. This lot includes two co-op/car sharing (Zipcars) parking spaces adjacent Lonsdale Avenue. The subject parcels are currently zoned as CD-216 (comprehensive development 216 zone), C-1A (commercial Central Lonsdale Mixed Use A) and C-1B (Central Lonsdale Mixed Use B).

Three other mixed commercial and retail parcels (C-1A) are located on the same block in the southeast corner of the 14th Street/Lonsdale Avenue intersection fronting onto Lonsdale Avenue. These parcels will not be covered by the proposed redevelopment. A North-South lane with a 6.0 metre right-of-way (RoW) runs parallel to and approximately 45 metres east of Lonsdale Avenue. This lane provides access to the existing uses on the subject site and parking behind the adjoining other businesses in the northwest corner. It is also occasionally used by through traffic traveling between 13th Street and 14th Street.

A high-rise mixed residential/commercial tower, referred to as The Grande, is located in the northwest corner of 13th Street/St. Georges Avenue immediately east of the existing Safeway building. To the northeast is an RCMP office building and a public park/plaza. A private driveway runs east-west along the northern perimeter of the adjacent tower and the existing Safeway building continuing through to the Safeway parking lot. In conjunction with the proposed redevelopment, this lane is to be discontinued at its west terminus a short distance into the site. An agreement has been reached which will retain a short westerly segment to allow garbage collection operations at the adjacent tower.

The subject site is located amidst numerous other retail, office, institutional and residential developments in the Central Lonsdale area of the City. Lions Gate Hospital is located to the northeast of the 13th Street/St. Georges Avenue intersection. A medical centre building, ICBC offices and a Fire Hall are located on the south side of 13th Street opposite the subject site. Two other pay parking lots are located on the south side of 13th Street. The City Hall and other civic facilities are located to the west of Lonsdale Avenue.

3. SITE TRAFFIC

This section presents the trip generation characteristics of the existing site and the proposed development. For this analysis, the site generated traffic was estimated using the June 21 development statistics consisting of 344 residential dwelling units, approximately 97,000 ft² of retail/ commercial area and approximately 79,000 ft² of office/ commercial area.

3.1 Existing Site

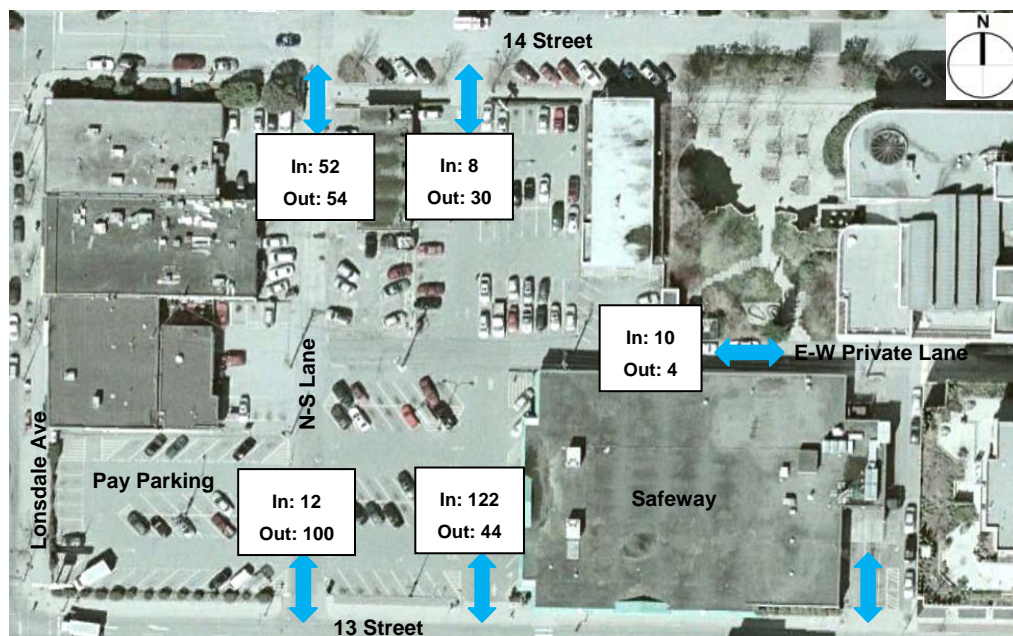
The subject site currently accommodates a Safeway grocery store with a gross floor area (GFA) of approximately 2,490 m² (26,830 ft²), a 38-space public pay parking including two co-op/car sharing spaces, a pet food store, and another smaller commercial building, which is currently vacant.

A number of other commercial/retail units are presently located immediately northwest of the site fronting Lonsdale Avenue. The existing North-South lane is also used by these stores for rear parking, service and delivery purposes. These existing stores and the subject development will share the North-South lane with access retained from 14th Street. For both existing and future uses, it will be important to keep the lane clear of all obstructions. The existing poles along the west side of the lane should be relocated or shielded to protect from potential impact by turning trucks. It is recommended that stopping be prohibited on the lane.

In addition to accesses via the North-South lane at 13th Street and 14th Street, the existing Safeway site has three additional accesses, one each on 13th Street and 14th Street, and access from St. Georges Avenue in the east via an east-west private lane. The access on 13th Street at the southeast corner serves trucks accessing the loading area for Safeway.

The subject site currently accommodates a total of approximately 155 parking spaces. The existing vehicular accesses to the site are illustrated in **Exhibit 3.1**.

Exhibit 3.1: Existing Site Accesses



3.2 Existing Site Traffic

Surveys were undertaken at the existing Safeway site to assess trip generation characteristics. Two different data collection approaches were followed:

- Pedestrian counts at the existing Safeway building entrance; and
- Vehicular traffic counts at the five existing site access points.

Table 3.1 provides a summary of the survey results. A total of 436 vehicles two-way were recorded in the weekday p.m. peak hour and 371 vehicles in the Saturday mid-day peak hour. These figures include traffic to/from Safeway and other uses on the subject site, i.e., the pay parking, and neighbouring businesses on Lonsdale Avenue, as well as some through traffic.

A total of 596 and 545 two-way pedestrian movements were recorded at the Safeway building entrance in the p.m. peak hour and Saturday peak hour, respectively.

Table 3.1: Existing Safeway Trip Generation and Site Access Volumes

| Item | Direction | PM Peak Hour | SAT Peak Hour |
|--|---------------------------|--------------|---------------|
| (a) Vehicular Movements at Site Accesses | Inbound | 204 | 204 |
| | Outbound | 232 | 167 |
| | Total Vehicles | 436 | 371 |
| (b) Pedestrian Movements at Safeway Entrance | Inbound | 303 | 255 |
| | Outbound | 293 | 290 |
| | Total Person Trips | 596 | 545 |

Based on results from surveys at the existing Safeway

Based on the existing Safeway floor area of approximately 26,830 ft², the total person trips equate to 22.2 persons/1000 ft² in the p.m. peak hour and 20.3 persons/1000 ft² in the Saturday peak hour.

It is difficult to ascertain the trip purpose of the vehicular traffic movements at the site accesses. There are both site and non-site traffic, as well as through traffic using the North-South lane. Furthermore, non-Safeway traffic parking on the site can exit the parking lot from all sides and difficult to intercept. The Safeway-oriented vehicular traffic was therefore estimated based on the observed person trips at the entrance to the Safeway building. Vehicle occupancy and mode split information was collected for the existing Safeway at both the site accesses and building entrances on May 9 and 12, 2012. The average vehicle occupancy was found to be 1.4 persons per vehicle and approximately 55% of the Safeway customers presently arrive by cars while the remaining 45% walk, bike or take transit. Based on this information, the observed Safeway person trips were expressed in vehicular trips. The resulting peak hour vehicular trip generation for the existing Safeway is presented in Table 3.2.

Table 3.2 includes a comparison with the ITE trip estimates using fitted curve equations for the category Shopping Centre (land use code 820). The ITE rates appear to provide slightly higher trip estimates for the existing Safeway. The existing site traffic volumes are illustrated in Exhibit 2.3.

Table 3.2: Comparison of Existing Safeway Trips vs. ITE Estimates

| Item | Direction | PM Peak Hour | SAT Peak Hour |
|--|----------------------------|--------------|---------------|
| Existing Safeway Auto Trips | Inbound | 119 | 100 |
| | Outbound | 115 | 114 |
| | Total Vehicle Trips | 234* | 214* |
| ITE Trip Generation for Existing Safeway | Inbound | 129 | 189 |
| | Outbound | 134 | 175 |
| | Total Vehicle Trips | 263** | 364** |

(*) Table 3.1 (b) person trips expressed in vehicular trips based on a vehicle occupancy of 1.4 persons/veh and auto mode split of 55%; (**) using ITE regression equations for Land Use Code 820 using existing Safeway size 26,830 ft²

Based on the traffic estimates for the existing Safeway given in Table 3.2, it is possible to separate non-Safeway traffic presently accessing the site. Given that a total of 436 and 371 vehicles were recorded in the two peak hours of which 234 and 214 are to/from Safeway, the remaining 202 (46%) and 157 (42%) vehicles/hour (two-way) are non-Safeway traffic. This includes users of public pay parking and pet food store, neighbouring stores along Lonsdale Avenue, co-op/shared car spaces, and through traffic using the North-South lane. The non-site traffic other than the adjacent stores will not access the site as there will be no public pay parking or a direct lane connection between 13th Street and 14th Street for through movements. Traffic will remain on the surrounding road network but will be spread over a number of alternative routes and destinations.

3.3 Proposed Development

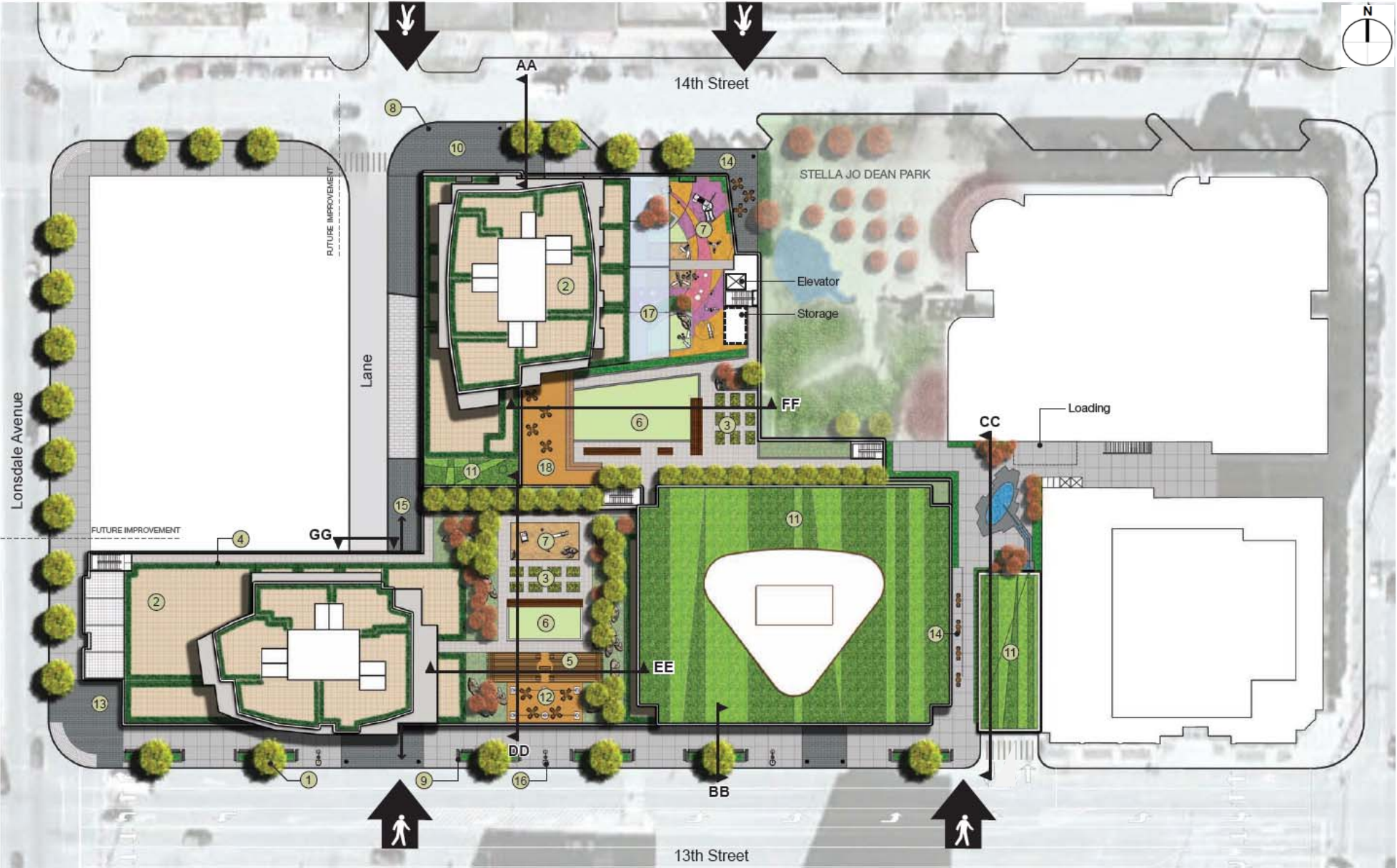
The proposed concept plan for the development is illustrated in **Exhibit 3.2** and the statistics are summarized in Table 3.3. Based on the current plan, the existing Safeway site and its adjoining parcels consisting of smaller commercial buildings and a public parking are to be consolidated and redeveloped to allow the construction of a high-density mixed residential and commercial development. The development will consist of approximately 9,010 m² (97,000 ft²) floor space of retail, 7,340 m² (79,000 ft²) of office and 344 multi-family dwelling units in two high-rise buildings.

Table 3.3: Proposed Development Statistics

| Proposed Land Uses | Size (dwelling units) | Floor Area ('000 ft ²) | Group |
|---------------------------|-----------------------|------------------------------------|-----------------|
| High-Rise Apartment | 344 | | Residential |
| Office | | 78.8 | Office |
| Grocery | | 36.7 | Shopping Centre |
| Pharmacy | | 11.2 | |
| Restaurant | | 8.3 | |
| General Retail | | 13.0 | |
| Fitness Center | | 22.2 | |
| Day Care | | 5.2 | |
| Total Residential | 344 units | | |
| Total Office Space | | 78,800 ft² | |
| Total Retail/Other | | 96,600 ft² | |

Two vehicular accesses are proposed for the future development, one from 13th Street approximately 50 metres west of St. Georges Avenue (measured between the nearest pavement edges) and another from 14th Street via the existing North-South lane 45 metres east of Lonsdale Avenue. Both accesses will lead into a common underground parking. The existing pay parking on this site will be removed. The existing North-South lane will be closed at its south end just north of 13th Street. In addition, the east-west private driveway will terminate shortly into the site. The

proposed child care facility will share the two vehicular accesses and the common underground parking proposed for the development. A number of on-site parking spaces will be designated for daycare pick-up/drop-off purposes. The daycare users will also be able to use on-street parking on 14th Street depending on availability.



3.4 Proposed Development Traffic

3.4.1 TRIP GENERATION – UNADJUSTED

The trip generation for the proposed development was initially estimated based on the Institute of Transportation Engineers' (ITE) standard trip rates. The ITE trip rates for the categories Shopping Centre (land use code 820), General Office Building (code 710) and Apartment (code 220) were considered. The ITE's recommended fitted-curve or regression equations were applied for the retail component of the development.

Table 3.4 provides a summary of trip generation calculations based on the ITE methodology and before any adjustments for site-specific conditions.

Table 3.4: Unadjusted ITE Trip Generation

| Land Use | GLA (ft ²) | Units | Period | Rate | %In | Total ⁴ | In ⁴ | Out ⁴ |
|------------------------|------------------------|-------|--------|------|-----|--------------------|-----------------|------------------|
| Retail ¹ | 97,000 | | PM | 6.43 | 49% | 623 | 305 | 318 |
| | | | SAT | 8.66 | 52% | 840 | 437 | 403 |
| Office ² | 79,000 | | PM | 1.49 | 17% | 118 | 20 | 98 |
| | | | SAT | 0.41 | 54% | 32 | 17 | 15 |
| Apartment ³ | - | 344 | PM | 0.62 | 65% | 213 | 139 | 75 |
| | | | SAT | 0.52 | 54% | 179 | 97 | 82 |
| Total Residential | | 344 | PM | | | 213 | 139 | 75 |
| | | | SAT | | | 179 | 97 | 82 |
| Total Non-Residential | 176,000 | | PM | | | 741 | 325 | 416 |
| | | | SAT | | | 873 | 454 | 418 |
| Total | 176,000 | 344 | PM | | | 954 | 464 | 490 |
| | | | SAT | | | 1,051 | 551 | 500 |

(1) ITE trip equations for Shopping Centre Code 820; (2) average rates for General Office Bldg Code 710; (3) average rates for Apartment Code 220; (4) figures expressed in trips per hour

In this multi-use development, a portion of the trips will be internal trips between the various uses. For example, some of the retail customers will be from the adjacent residential units in this development. The ITE recommended methodology to estimate internal trip capture is provided in its publication titled *Trip Generation Handbook*. Internal trip estimates for the proposed development applying the ITE methodology are summarized in **Table 3.5**.

In addition, the retail component of the development will attract a portion of the trips from the existing traffic on the adjacent roads. Some of the traffic on the adjacent roads attracted to a new development is referred to as "pass-by" trips. The ITE's *Trip Generation Handbook* indicates the percentage of pass-by trips for the proposed development could be up to 40%. In this study, a more conservative 10% pass-by trips was assumed for both the p.m. and Saturday peak hours. The pass-by trips resulted in additional turning movement volumes at the site accesses. The trip generation adjustments for internal and pass-by trips are shown in **Table 3.5**.

Table 3.5: Trip Generation Adjustments

| Land Use | PM Peak Hour | | | SAT Peak Hour | | |
|----------------------------------|--------------|------------|------------|---------------|------------|------------|
| | Total | In | Out | Total | In | Out |
| (a) Unadjusted Trips: | | | | | | |
| Retail | 623 | 305 | 317 | 840 | 437 | 403 |
| Office | 118 | 20 | 98 | 32 | 17 | 15 |
| Residential | 213 | 139 | 75 | 179 | 97 | 82 |
| Total | 954 | 464 | 490 | 1,051 | 551 | 500 |
| (b) Internal Trips: | | | | | | |
| Retail | 78 | 34 | 44 | 87 | 44 | 43 |
| Office | 14 | 6 | 8 | 8 | 4 | 3 |
| Residential | 67 | 40 | 27 | 80 | 39 | 41 |
| Total | 159 | 80 | 80 | 175 | 87 | 87 |
| (c) External Trips: (a-b) | | | | | | |
| Retail | 544 | 271 | 273 | 751 | 392 | 359 |
| Office | 103 | 14 | 89 | 24 | 13 | 12 |
| Residential | 146 | 99 | 47 | 99 | 58 | 41 |
| Total | 793 | 384 | 408 | 874 | 463 | 412 |
| (d) Pass-By Trips: | | | | | | |
| Retail (pm 10%, Sat 10%) | 54 | 27 | 27 | 75 | 38 | 38 |
| (e) Net New Trips: (c-d) | | | | | | |
| Retail | 490 | 244 | 246 | 676 | 354 | 321 |
| Office | 103 | 14 | 89 | 24 | 13 | 12 |
| Residential | 146 | 99 | 47 | 99 | 58 | 41 |
| Net New Trips | 738 | 357 | 381 | 799 | 425 | 374 |

3.4.2 TRIP GENERATION – MODE SHARE ADJUSTMENTS

At the existing Safeway site, vehicular trip generation is low due to a high percentage (45%) of non-vehicular, i.e., walk, bike and transit trips. The ITE trip rates are representative of mostly sub-urban locations in the U.S. with very little or no non-vehicular traffic. For the proposed development in the Central Lonsdale neighbourhood, a higher percentage of walk, transit and bike trips is expected, which requires site-specific adjustments to the ITE trip estimates in Table 3.5.

The ITE vehicular trip estimates in Table 3.5 were expressed into equivalent person trips. The ITE rates were assumed to capture 95% of the total trip generation. Average vehicle occupancy of 1.4 persons per vehicle was applied, which is based on the survey results for the existing Safeway site. The estimated person trips were then divided by anticipated mode of travel. As discussed in Section 3.2, surveys conducted at the existing Safeway indicate approximately 55% of the existing trips are auto trips and the remaining 45% are walk, bike and transit trips.

The City of North Vancouver's official *Long-Term Transportation Plan, 2008* indicates that in Central Lonsdale approximately 50% of existing daily trips are auto, 25% walk, 23% by transit and 2% bike. The regional *Trip Diary Survey* and Statistics Canada's *2006 Census* data for the entire City also indicate a high percentage of non-auto trips. For the purpose of analysis, the existing percentage of auto trips at 55% was also considered for the future site, which is the average of the rate in the City's Long Term Transportation Plan (50%) and that shown in the 2006 Census Results (61%), and also equates to the mode share observed at the existing Safeway. Automobile use is expected to reduce further in the long term with the on-going pedestrian and cyclist facility enhancements, improved transit service, City-wide demand management measures and other factors.

The resulting vehicular trip estimates, which take into account walk, bike and transit trips, are summarized in Table 3.6. Overall, the development is estimated to generate a total of 1,088 person trips in the p.m. peak hour (526 inbound and 562 outbound) and 1,178 person trips in the Saturday peak hour (626 inbound and 551 outbound). This compares to a total of approximately 596 and 545 person trips recorded at the Safeway accesses in the two peak hours, respectively.

Table 3.6: Mode Adjustments - New Auto Trips

| Item | | Total | In | Out | Total | In | Out |
|--|--|------------|------------|------------|------------|------------|------------|
| (a) ITE New Auto Trips | | 738 | 357 | 381 | 799 | 425 | 374 |
| (b) ITE New Trips all Modes (a)÷0.95 | | 777 | 376 | 401 | 841 | 447 | 394 |
| (c) Total Person Trips all Modes (b)x1.4 | | 1,088 | 526 | 562 | 1,178 | 626 | 551 |
| (d) Person Trips by Auto (c)x 55% | | 598 | 289 | 309 | 648 | 345 | 303 |
| (e) Vehicular Trips (d)÷1.4 person/veh | | 427 | 207 | 221 | 463 | 246 | 217 |

3.4.3 TRIP DISTRIBUTION

The trip distribution of the proposed development was estimated based on the assumed catchment area for the retail development, shown in Exhibit 3.2, and applying Statistics Canada's population and dwelling unit counts. A market area similar to that for the existing Safeway was assumed for the proposed commercial development. Slight adjustments were made to take into account non-retail components of the development.

Exhibit 3.2: Market Catchment Area for Existing Safeway



The retail component of the development generates approximately 80% of the trips in the p.m. and Saturday peak hours. The anticipated orientation of the residential and office were taken into consideration.

The projected trip distribution for the development is provided in **Table 3.7**. As shown in the table, the majority of the trips are expected to be oriented to the east and west on 13th Street and also north on Lonsdale Avenue.

The pass-by trips were separately assigned to the adjacent 13th Street and Lonsdale Avenue based existing peak hour traffic volumes on these roads.

Table 3.7: Trip Distribution – New Auto Trips

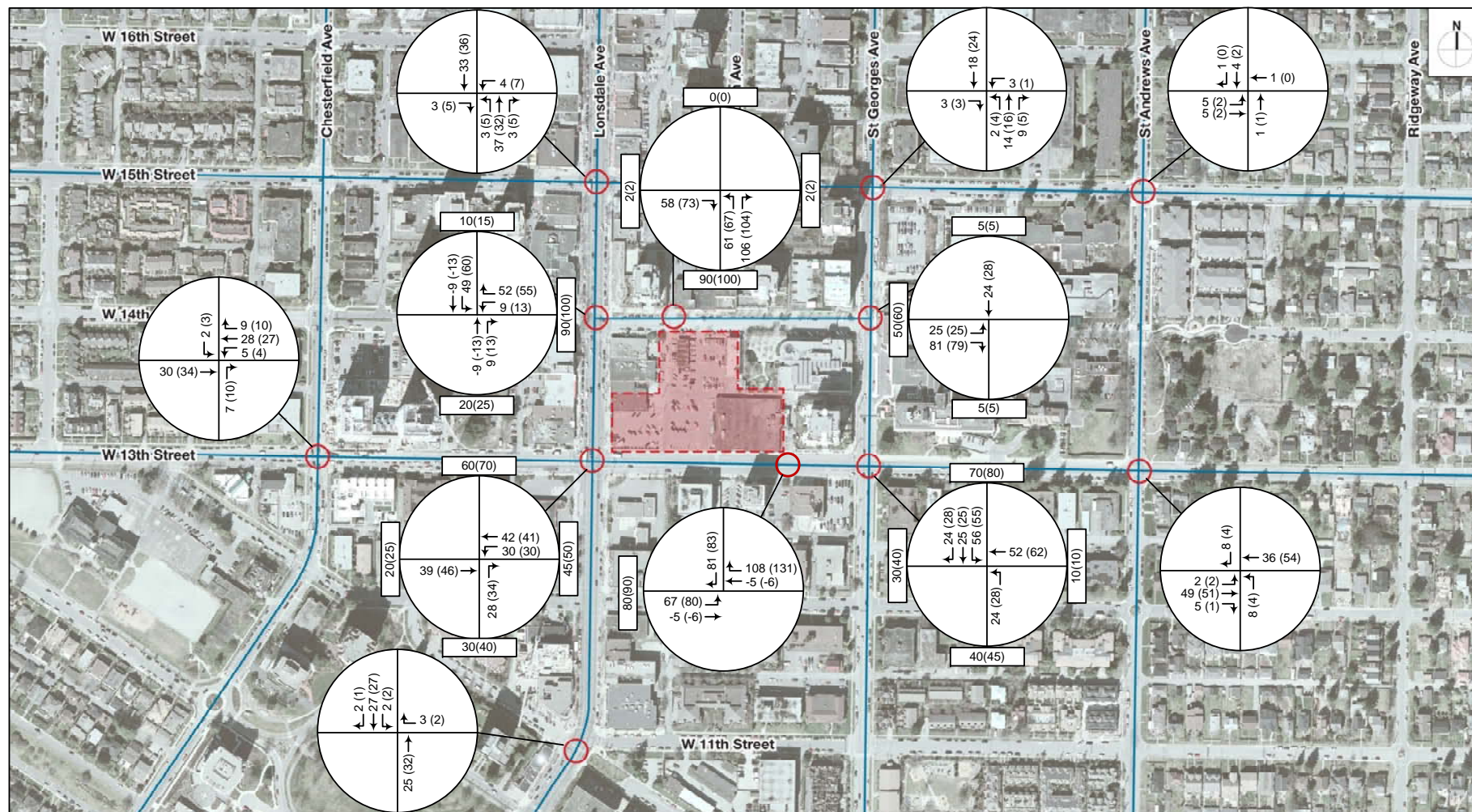
| Sector | % Distribution | PM Peak Hour | | SAT Peak Hour | |
|-----------------------|----------------|--------------|------------|---------------|------------|
| | | Inbound | Outbound | Inbound | Outbound |
| South on Lonsdale Ave | 14% | 28 | 30 | 34 | 30 |
| North on Lonsdale Ave | 19% | 40 | 43 | 48 | 42 |
| West on 13 Street | 19% | 39 | 42 | 46 | 41 |
| East on 13 Street | 25% | 52 | 56 | 62 | 55 |
| North on St Georges | 11% | 24 | 25 | 28 | 25 |
| South on St Georges | 11% | 24 | 25 | 28 | 25 |
| Total | 100% | 207 | 221 | 246 | 217 |

The analysis assumed left turn exit movements prohibited from the future access onto 13th Street. This affects approximately 80 vehicles/hour leaving the site and heading east on 13th Street (55 vehicles) and also south on St. Georges Avenue (25 vehicles). The affected traffic will egress via the North-South lane and make a right turn from 14th Street onto St. Georges Avenue and then turn left or continue southbound utilizing the signals at the 13th Street/ St. Georges Avenue intersection.

3.4.4 SITE TRAFFIC ON ROADS

Based on the trip generation and distribution assumptions, and taking into account the most logical routes, the site traffic was assigned to the surrounding road network. **Exhibit 3.3** illustrates the resulting site traffic volumes at the selected intersections.

The site traffic will be spread over a number of available routes and in the inbound and outbound directions of travel. The incremental volume of the site traffic on any individual movement is expected to be low.



| | | |
|--|--|---|
| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes (xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client: Onni</p> <div data-bbox="877 1328 1003 1458"> </div> | <p>Proposed Mixed-Use Development, North Vancouver</p> <p>Exhibit 3.3 Future Site Traffic Volumes</p> <p>Project No. 29039</p> |
|--|--|---|

4. COMBINED TRAFFIC CONDITIONS

The "combined" or post-redevelopment traffic conditions in the 2014 opening year and 10 years after opening, i.e., in 2024 were analyzed. The combined volumes were obtained by superimposing the future site traffic volumes over the 2014 and 2024 background volumes and subtracting the existing site traffic volumes. The resulting combined volumes in the p.m. and Saturday peak hours in the 2014 and 2024 horizon years are given in **Exhibits 4.1** and **4.2**, respectively.

4.1 Combined Traffic Analysis

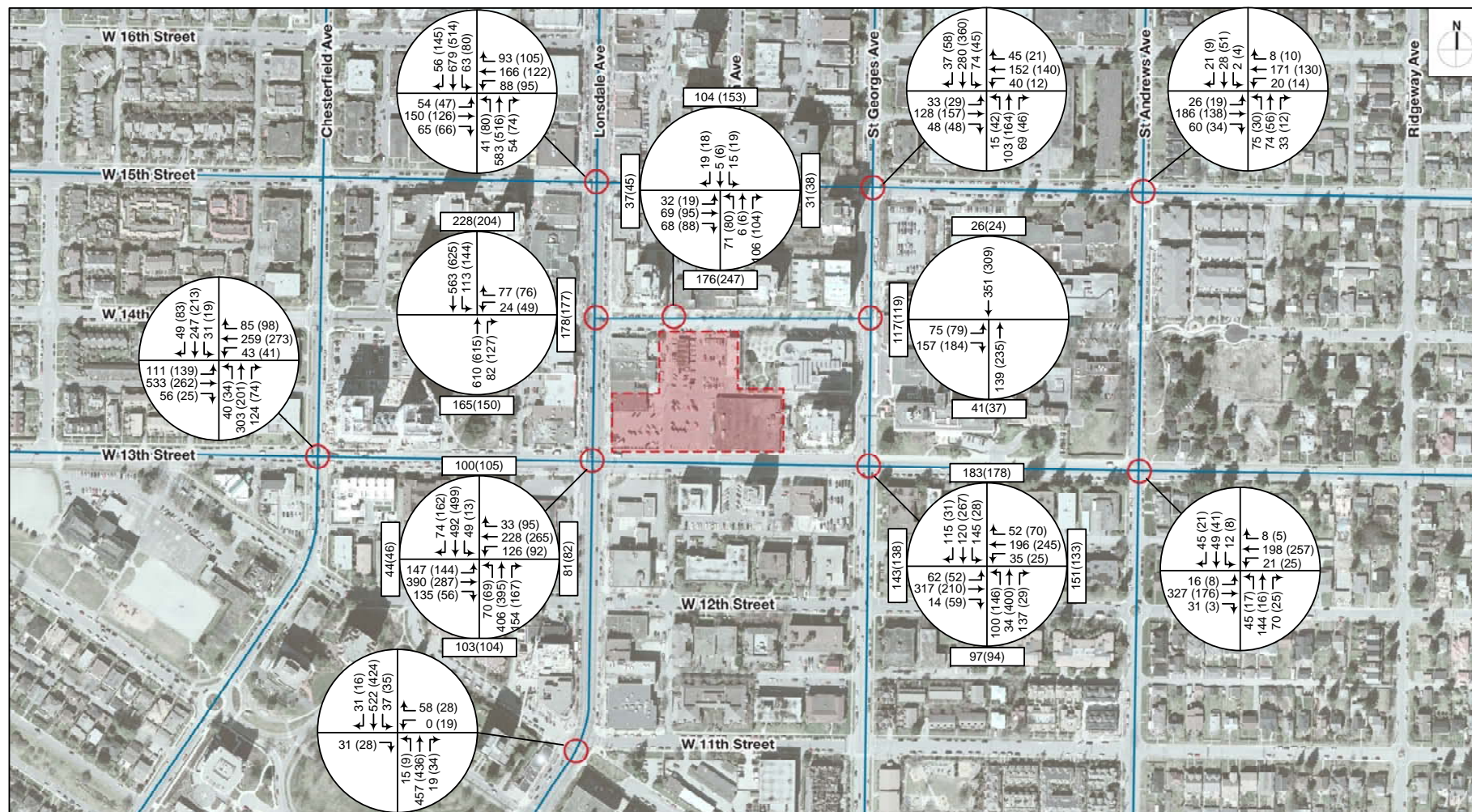
The 11 selected intersections were reanalyzed this time applying the 2014 and 2024 combined volumes. **Table 4.1** provides a summary of the results and more detailed results are given in the appendix.

As shown in the table, all 11 intersections are expected continue to operate in a satisfactory manner even with traffic from the entire development in place. In the 2024 p.m. and Saturday peak hours, the Level of Service (LoS) at the intersections is expected to remain unchanged at C or better with a volume/capacity (v/c) ratio well within the typical threshold of 0.90. No capacity improvements are therefore recommended. Similar to the background conditions, for the unsignalized 13th Street/St. Andrews intersection Synchro results show LoS E or F. Given the low volume of traffic and availability of suitable alternative routes, no improvements are necessary. The 14th Street/St. Georges Avenue intersection and pedestrian crossing movements will perform satisfactorily despite the increase in the eastbound right-turn volumes.

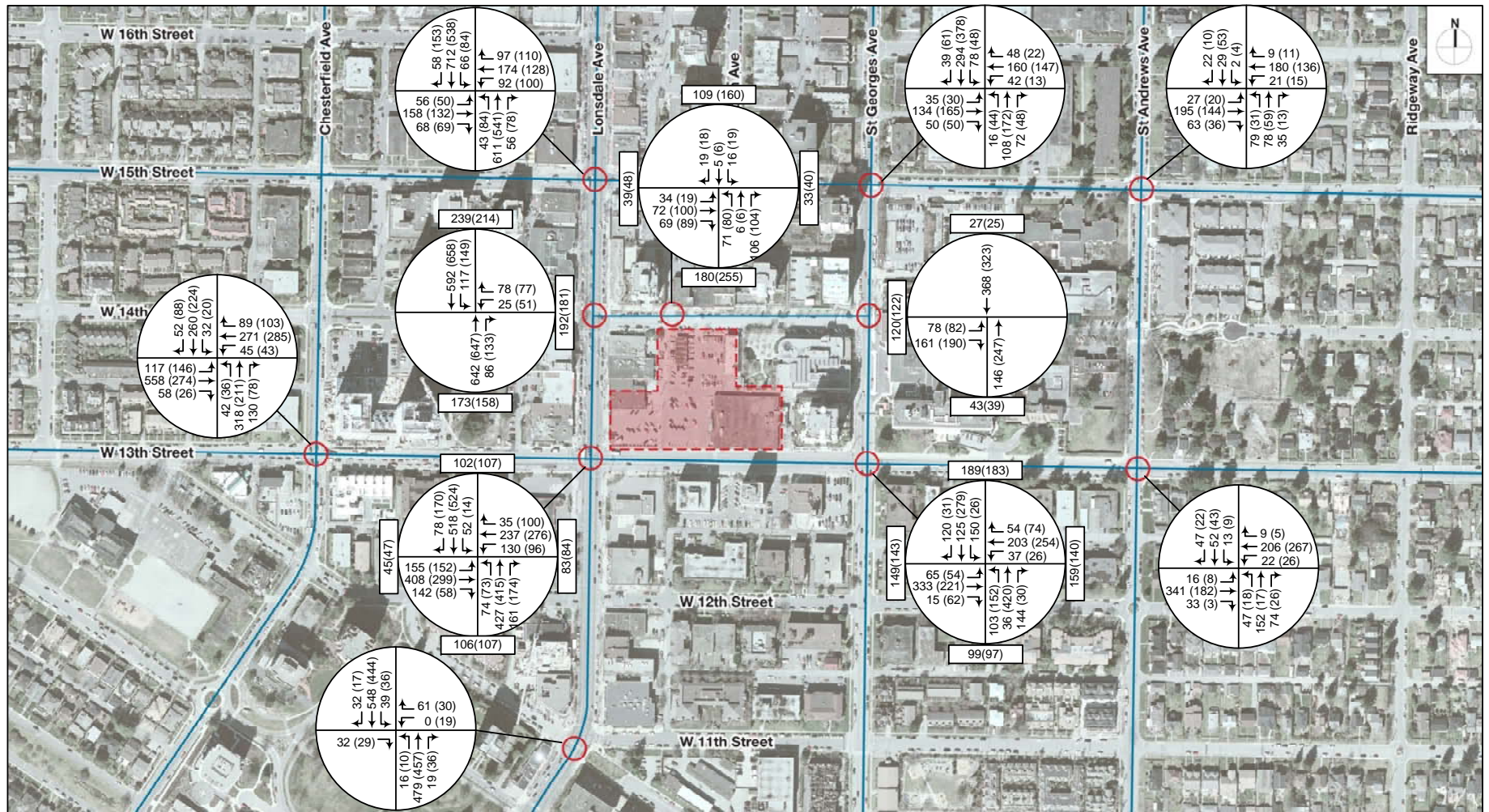
Table 4.1: Summary of Intersection Performance – Combined Traffic

| Intersection | Peak Hour | 2014 | | | 2024 | | |
|----------------------------|-----------|------|-------|------|------|-------|------|
| | | LoS | Delay | v/c | LoS | Delay | v/c |
| 13 Street/Chesterfield Ave | PM | B | 11 | 0.63 | B | 11 | 0.66 |
| | SAT | A | 9 | 0.47 | A | 10 | 0.49 |
| 11 Street/Lonsdale Ave | PM | B | 11 | 0.43 | B | 11 | 0.45 |
| | SAT | B | 11 | 0.34 | B | 12 | 0.36 |
| 13 Street/Lonsdale Ave | PM | B | 13 | 0.57 | B | 14 | 0.59 |
| | SAT | B | 12 | 0.54 | B | 12 | 0.57 |
| 14 Street/Lonsdale Ave | PM | B | 13 | 0.61 | B | 12 | 0.65 |
| | SAT | B | 11 | 0.76 | B | 12 | 0.81 |
| 15 Street/Lonsdale Ave | PM | B | 14 | 0.63 | B | 14 | 0.67 |
| | SAT | B | 13 | 0.65 | B | 14 | 0.69 |
| 13 Street/St. Georges | PM | B | 13 | 0.49 | B | 14 | 0.52 |
| | SAT | B | 16 | 0.64 | B | 17 | 0.67 |
| 15 Street/St. Georges | PM | B | 10 | 0.48 | B | 11 | 0.59 |
| | SAT | B | 10 | 0.51 | B | 11 | 0.61 |
| 13 Street/St. Andrews | PM | E | 42 | 0.78 | F | 54 | 0.85 |
| | SAT | B | 14 | 0.16 | B | 15 | 0.18 |
| 15 Street/St. Andrews | PM | C | 21 | 0.47 | C | 23 | 0.52 |
| | SAT | B | 14 | 0.21 | B | 15 | 0.23 |
| 14 Street/St. Georges | PM | C | 15 | 0.31 | C | 16 | 0.33 |
| | SAT | C | 17 | 0.35 | C | 17 | 0.36 |
| 14 Street/N-S Lane | PM | C | 17 | 0.41 | C | 18 | 0.41 |
| | SAT | C | 19 | 0.44 | C | 19 | 0.45 |

LoS= Level of Service, Delay=average delay in seconds per vehicle; v/c ratio=volume to capacity ratio; overall intersection for signalized and the worst movement for unsignalized intersections



| | | |
|---|--|--|
| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes</p> <p>(xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client:</p> <p>Onni</p> | <p>Proposed Mixed-Use Development, North Vancouver</p> |
| |  | <p>Exhibit 4.1 2014 Combined Traffic Volumes</p> <p>Project No. 29039</p> |



| | | |
|--|--|---|
| <p>LEGEND:</p> <p>xxx: PM Peak Hour Traffic Volumes</p> <p>(xxx): Midday Saturday Peak Hour Traffic Volumes</p> <p>Note: Not to Scale, Google Earth Imagery</p> | <p>Client:</p> <p>Onni</p> <div data-bbox="879 1333 1005 1458"> </div> | <p>Proposed Mixed-Use Development, North Vancouver</p> <p>Exhibit 4.2 2024 Combined Traffic Volumes</p> <p>Project No. 29039</p> |
|--|--|---|

4.2 Site Access

Two accesses are proposed for the development, one on 13th Street near the southeast corner of the site and the other one from the North-South lane which leads to 14th Street. Presently there are three accesses on 13th Street and two on 14th Street, including access via the North-South lane.

- (a) South Access (13th Street): This access is to be located approximately 50 metres west of St. Georges Avenue, measured between the nearest curbs. This will replace an existing loading access for the Safeway building. The future access will lead into a common underground parking. The access will serve approximately 300 vehicles two-way in the peak hour for which a single lane in each direction, inbound and outbound, will suffice. Separate turn lanes will not be required on the access. Given the proximity to the signalized intersection of 13th Street/St. Georges Avenue, it is recommended that left turn exit movements from this access be prohibited. At present a separate eastbound left turn lane is provided on 13th Street at St. Georges Avenue with a 25 metre taper and 30 metre storage. Beyond the left turn lane a wide painted centre median exists on 13th Street which could be utilized to develop an eastbound left turn lane into the proposed access. Slight modifications to the existing eastbound left turn lane taper at the adjacent intersection will be necessary. This will not be an issue given that the low volume of eastbound left turn at the adjacent intersection is low (up to 65 vehicles/hour). A “Right Turn Only” sign is recommended on the access approach. A raised centre median to prohibit left turn exit movements can be accommodated but this is not desirable due to fire and hospital emergency vehicle movements in the area. Flexible centreline delineator posts are recommended to indicate left turn exit prohibition. A continuous sidewalk is recommended on the north side of 13th Street across this access to indicate pedestrian priority. Both sides of the access should be kept clear of any object obstructing driver/pedestrian sight lines.



- (b) North Access (14th Street): This will be an indirect access from 14th Street via the existing North-South lane. The lane will be shared with existing stores fronting Lonsdale Avenue. This access will lead into the underground parking and be located just north of the loading bay. The projected site traffic volume on the lane is 250 vehicles two-way in the peak hour. It is understood that a turnaround point will be provided near the south terminus of the lane. It is recommended that both sides of the access and the loading facility will be kept clear of obstructions to ensure visibility of pedestrians on the proposed walkway on the east side of the lane. To ensure sight lines and facilitate traffic movements, stopping should be prohibited on the lane and also on the south side of 14th Street between Lonsdale Avenue and the North-South lane. The sidewalk on the south side of 14th Street should be continued across the lane by means of a straight flare. The design of the lane and the access will be determined based on turning path analysis. Both sides of the lane at 14th Street and at site accesses should be kept clear of any object obstructing sight lines.

The proposed site accesses were analyzed applying the 2024 combined traffic volumes. The results presented in Table 4.2 indicate satisfactory performance in both p.m. and Saturday peak hours.

Table 4.2: Summary of Access Performance (2024)

| Intersection/Period | Measure | EBL | WBL | WBR | NBT | SBL | SBR |
|---------------------------|-----------|------|------|------|------|------|------|
| (a) PM Peak Hour: | | | | | | | |
| Access/13th Street | LoS | B | x | A | x | x | C |
| | v/c Ratio | 0.10 | | 0.14 | | | 0.27 |
| | Delay, s | 11 | | 0 | | | 20 |
| | Queue, m | 3 | | 0 | | | 8 |
| Access/N-S Lane | LoS | x | A | A | A | A | x |
| | v/c Ratio | | 0.17 | 0.17 | 0.03 | 0.10 | |
| (b) SAT Peak Hour: | | | | | | | |
| Access/13th Street | LoS | B | x | A | x | x | C |
| | v/c Ratio | 0.12 | | 0.15 | | | 0.24 |
| | Delay, s | 10 | | 0 | | | 18 |
| | Queue, m | 3 | | 0 | | | 7 |
| Access/N-S Lane | LoS | x | A | A | A | A | x |
| | v/c Ratio | | 0.18 | 0.18 | 0.04 | 0.12 | |

The following is a brief summary of the analysis results:

- Both accesses operate satisfactorily at LoS C or better;
- All movements operate well with a v/c ratio of 0.27 or lower;
- The 95th percentile queue length for the left-turn movement from 13th Street into the site will be less than 5.0 meters;
- The unsignalized access on the North-South Lane will operate without any problem due to low traffic volumes; and
- The access on 13th Street is expected to operate similar to the existing site access on 13th Street. In addition, there will be fewer conflict points on 13th Street due to the removal of an adjacent access, prohibition of left turn egress, and truck back-in into the Safeway loading bay.

4.2.1 14TH STREET CONFIGURATION

In the vicinity of the site, 14th Street presently accommodates two-way traffic flow for approximately 45 metres between Lonsdale Avenue and the North-South lane while it is restricted to one-way eastbound only movements between the lane and St. Georges Avenue.

This is presumably part of traffic calming measures implemented along 14th Street throughout North Vancouver. Other measures implemented elsewhere include dead-end segments, traffic circles, and corner bulges.

Excluding parking on both sides, the effective width currently available for traffic flow is approximately 7.0 metres on the one-way segment and 8.0 metres on the two-way segment. The

peak hour traffic volume on 14th Street at the west end is approximately 300 vehicles two-way compared to 190 vehicles one-way eastbound at the east end.

The City requested a review of potential reconfiguration of 14th Street from one-way to two-way adjacent to the site. Such conversion would facilitate access to developments on both sides of 14th Street and also Lions Gate Hospital. This will also increase connectivity in the road network. Due to this change, minor traffic redistribution is expected. For example, some of the westbound traffic on 13th Street presently performing a right turn at Lonsdale Avenue and southbound traffic on St. Georges Avenue making a right turn at 13th Street would reroute and use the new westbound link on 14th Street. Such redistribution is not likely to have any significant impact at the intersections of 14th Street at Lonsdale Avenue or at St. Georges Avenue. With the two-way operation in place, the subject development is estimated to add up to 50 vehicles/hour to the westbound movement on 14th Street. The overall level of service will remain satisfactory.

The reconfiguration to accommodate two-way movements can be physically accomplished by means of lane marking revisions within the existing pavement width. This reconfiguration is however not necessary to accommodate traffic generated by this development.

4.3 Parking Requirements

This section presents parking requirements for the proposed development, based on 342 apartment units and 180,557 ft² of commercial space currently proposed.

With reference to the subject mentioned above, the new development requires 952 parking spaces (illustrated in Table 4.3)

The City of North Vancouver's *Zoning Bylaw, 1995, No. 6700, Division IV: Parking and Loading Standards*, outlines minimum off-street parking requirements for new developments. **Table 4.3** provides a summary of the parking calculations for the proposed development based on the City's Bylaw. The requirement depends on the zoning assumption for the office and commercial retail units. Based on the assumed C1-A, C1-B zoning, the requirement equates to 835 parking spaces, while based on C-2, C-3, CS-1 zoning, the requirement increases to 921 spaces.

Table 4.3: Bylaw Parking Requirements

| Required Parking Spaces per Bylaw | | | | |
|-----------------------------------|-----------------------------|---------|--|------------------|
| Land Use | Development (Units/ Sq. ft) | | Bylaw Rate | Spaces |
| Residential | Market | 330 | 1.2 spaces/Unit | 396 |
| | Affordable | 12 | 0.75 spaces/Unit | 9 |
| Commercial | Food Store | 36,654 | 1.0 space/200 ft ² | 183 |
| | Office/Other Commercial* | 129,491 | 1.0 space/750 ft ² (500 ft ²) | 173 (259) |
| | Restaurant** | 8,311 | 1.0 space/125 sq. ft. | 66 |
| | Childcare | 6,101 | 1.0 space/750 sq. ft. | 8 |
| Residential Required | | | | 405 |
| Commercial Required | | | | 430 (516) |
| Total Required | | | | 835 (921) |

*1 space/750 ft² for a building in C1-A, C1-B Zones, for the same use in C-2, C-3, CS-1 the requirement is 1 space/500 ft²;

** requirement for a restaurant in CS-1 or CS-3 Zone

The current site concept plan includes a total of 926 parking spaces in the underground parking, which meets the bylaw requirements. Based on the requirement for developments in C-2, C-3, CS-1 zones, there would be only five parking spaces in excess of the requirement.

A portion of on-site parking spaces closest to the building entrances should be designated as disabled parking. It is recommended that five on-site parking spaces close to the child care facility be designated for short duration pick-up/drop-off purposes. Five on-site parking spaces can be designated for car-sharing/co-op programs to promote this alternative mode of travel. It would be desirable to separate commercial and residential parking and prohibit use of commercial parking by residents.

With the removal of an existing site access on 14th Street, additional angled parking could be added on the south side. Given that the underground ramp from 13th Street will have a vertical clearance of 3.0 metres, loading/unloading of HandyDART vehicles, ambulances, and smaller delivery trucks can also take place in the underground parking.

4.4 Loading Requirements

4.4.1 EXISTING TRUCK ACCESS AND LOADING

At present, a total of 10 to 12 trucks per day serve the existing Safeway, of which, typically two and occasionally four are tractor semi-trailer trucks with the remaining ones being smaller single unit/straight trucks. The largest truck presently arriving is WB-20, which has an overall length of 21.3 meters (70 feet). All trucks presently access the loading bay by reversing in from 13th Street, which affect traffic operations on this major arterial and is undesirable from a pedestrian movement point-of-view. Large trucks arrive from the north on Lonsdale Avenue.

4.4.2 LOADING REQUIREMENTS

Table 4.4 summarizes the number of loading spaces required under the City's Zoning Bylaw. The bylaw stipulates loading requirements for commercial buildings involving the movement of goods and materials by trucks.

Table 4.4: Loading Requirements

| Land Use/ Class of Building | Bylaw Rate | Development | Bylaw Requirement |
|-----------------------------|---------------------------------------|-------------------------|-------------------|
| Commercial | 1.0 spaces per 15,000 ft ² | 180,557 ft ² | 12 |

For the proposed commercial uses in this development, a total of 12 loading bays are required which seems excessive considering the practical requirements in an urban environment.

To address practical loading requirements for multi-unit residential uses and for commercial uses including grocery stores and supermarkets, the City of Richmond and Toronto Loading standards have been reviewed for comparison purposes. Tables 4.5 and 4.6 summarize loading space requirements based on bylaws from these two reference cities.

Table 4.5: Loading Requirements (Richmond, BC)

| Land Use | Bylaw Rate | Bylaw | | Bylaw (shared)* | |
|-------------|--|--------|-------|-----------------|-------|
| | | Medium | Large | Medium | Large |
| Residential | Medium: 1+1 space/ each 160 du over 240 du | 2 | 1 | 1 | 1 |
| | Large : 1 space/ every 2 bldg | | | | |
| Commercial | Medium: 1+1 space/ each 53,820 (ft ²) over 20,020 (ft ²) | 5 | 4 | 1 | 4 |
| | Large: 1 space/ each 53,820 (ft ²) over 20,020 (ft ²) | | | | |
| Total | | 7 | 5 | 2 | 5 |

* On-site medium-size & large-size loading spaces could be shared

Table 4.6: Loading Requirements (Toronto, ON)

| Land Use | Bylaw Rate | Bylaw | |
|-------------|------------------------------------|--------|-------|
| | | Medium | Large |
| Residential | 1.0 medium spaces/ 31 to 399 units | 1 | 0 |
| Commercial | 323000 ft ² or greater | 3 | 2 |
| Total | | 4 | 2 |

Allowance is being made for a total of six loading spaces, except that maximum flexibility is provided by having four large spaces and two medium spaces, of which one large space will be for residential uses and the remaining five for commercial uses.

4.4.3 PROPOSED TRUCK ACCESS

In determining the location for truck entry and exit points, the following routes have been considered:

| Loading Dock Access - Comparison | | |
|----------------------------------|---|--|
| Route | Advantage | Disadvantage |
| St Georges Ave | <ul style="list-style-type: none"> Away from main pedestrian corridor on E 14th Street; | <ul style="list-style-type: none"> Furthest route from Lonsdale; A route used by Hospital vehicles; Narrow private lane to access site; Large space required for internal truck maneuvering; Private lane sharing issues; Potential on-street queuing; Lane is RCMP emergency entrance |
| E 13 th Street | <ul style="list-style-type: none"> Dedicated left turn lane for truck maneuvering; | <ul style="list-style-type: none"> Further route from Lonsdale than 14th St; A route used by Fire/ Hospital vehicles; Large space required for internal truck maneuvering; Wide entry point required for truck maneuvering; Conflict with pedestrian movements; Within a main pedestrian corridor |
| E 14 th Street | <ul style="list-style-type: none"> Shortest Distance from Hwy 1 and a truck route (Lonsdale Ave); Not used by emergency vehicles; Minimum space required for internal truck maneuvering; Minimum width of entry/ exit point required for truck maneuvering; Future loading access for a development at the SE corner of Lonsdale/ 14th St | <ul style="list-style-type: none"> Within E 14th Street pedestrian corridor |

Considering advantages and disadvantages of each alternative truck route, access via Lonsdale Avenue, 14th Street and the North-South lane has been selected as the most suitable route.

For a satisfactory loading access from 14th Street for tractor semi-trailer trucks, the following measures are recommended:

- Given the roadway geometric constraints, the overall length of the largest truck serving the future site should be limited to 19.5 metres (64 feet) or WB-17 trucks;
- WB-17 trucks will arrive during pre-defined time periods, preferably outside of the mid-day pedestrian peak period of activity and afternoon traffic peak hours;
- On-street parking on south side of 14th Street between Lonsdale Avenue and the lane be removed.

A separate agreement has been reached with the adjacent mixed-use building (The Grande) management, as discussed in Section 2.1 to retain their garbage collection capabilities on the east-west private lane.

The proposed relocation of the loading bay from 13th Street to the lower volume lane via 14th Street will improve traffic flow and safety on 13th Street, which is a major arterial road. The proposed arrangement with a small number trucks and WB-17 semi-trailer trucks arriving during pre-defined hours will be acceptable.

4.5 Bicycle Parking Requirements

Table 4.6 summarizes the bicycle parking requirements under the City's Bylaw and the proposed supply. For the proposed development a total of 136 short term bike parking and 581 secure parking spaces are required based on the parking bylaw.

Table 4.6: Bylaw Bicycle Requirements

| Land Use/ Class of Building | Bylaw Rate | Description | Bylaw |
|-----------------------------|-------------------------------------|-------------------|------------|
| Residential | 6 spaces per every 60 units | short term | 35 |
| | 1.5 space per unit | secure | 513 |
| Commercial | 6 spaces per 10,764 ft ² | short term | 101 |
| | 1 spaces per 2,690 ft ² | secure | 68 |
| Total | | short term | 136 |
| | | secure | 581 |

It is understood that adequate bicycle parking will be provided which will meet the bylaw requirements.

Accessory end destination facility requirements are also applicable to this development. Such facilities include water closets, showers and wash basins for non-residential users. The current development plan includes six showers, four toilets, and six wash basins.

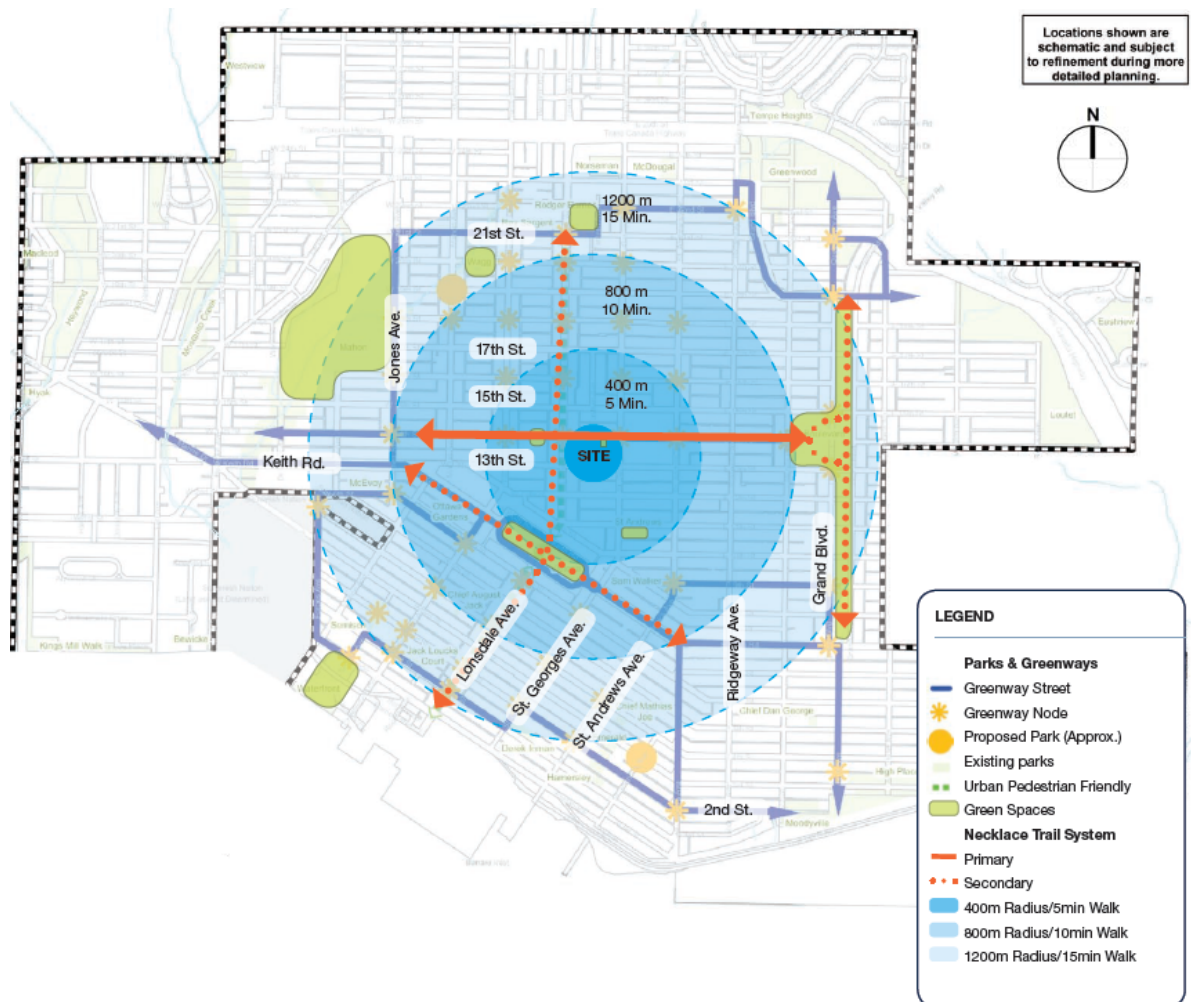
5. ASSESSMENT OF ALTERNATIVE MODES

This section presents a discussion on the existing non-vehicular modes of travel, which includes walk, bike and transit, and the associated trip generation by mode due to this development.

5.1 Existing Pedestrian Facilities

The subject site is located in an urban environment amidst a number of other retail, commercial, healthcare facilities, parks, transit stops and other amenities that generate significant pedestrian activity. The location of the site in the context of various pedestrian routes is shown in **Exhibit 5.1**. Lonsdale Avenue and 14th Street are designated as secondary greenways in the *City of North Vancouver Long-Term Transportation Plan, 2008*. Both of these roads are also designated as part of the Necklace Trail System. The existing pedestrian volumes at the selected intersections are provided in Appendix A.

Exhibit 5.1: Existing Pedestrian Routes



At present sidewalks are provided on both sides of all roads in the vicinity of the site. Also, the sidewalks are connected by crosswalks and corner ramps at the intersections. Crosswalks are

provided on all legs at the signalized intersections. Marked crosswalks are also provided at the unsignalized intersections, which include the following locations:

- 13th Street/St. Andrews Avenue: west leg only;
- 14th Street/St. Georges Avenue: north and south legs;
- 14th Street/North-South Lane: South leg only; and
- 15th Street/St. Andrews Avenue: west, north and south legs.

At the intersection of 14th Street/St. Georges Avenue, special crosswalks, i.e., overhead signs with pedestrian activated flashing beacons are provided for east-west pedestrian crossing movements.

5.1.1 13TH STREET MID-BLOCK CROSSWALK

A mid-block crosswalk is provided on 13th Street adjacent to the site for north-south pedestrian movements. At this crosswalk, a small raised centre median on 13th Street allows pedestrians to use median refuge and cross the road in two stages. The crosswalk is approximately 100 metres east of the signalized Lonsdale Avenue intersection, and 114 metres west of another north-south crosswalk at the St. Georges Avenue intersection. **Exhibit 5.2** illustrates the existing mid-block crosswalk on 13th Street. The crosswalk is aligned with the existing Safeway building entrance on the north side and a medical centre building at the south end.

Exhibit 5.2: Existing Mid-Block Pedestrian Crossing on 13th Street



On October 25 and 30, 2010, IBI Group recorded pedestrian activity at the mid-block crosswalk during the weekday mid-day peak hour and the Saturday mid-day peak hour. The weather was clear or sunny on both days. A summary of the counts is provided in **Table 5.1**. Approximately 220 pedestrians were recorded at the crosswalk in the p.m. peak hour and 100 pedestrians in the Saturday mid-day peak hour. Based on count data for the adjacent intersections, two-way vehicular traffic volumes on 13th Street during these time periods are 950, 835 vehicles, respectively. The level of interaction between pedestrians and vehicular traffic at the crosswalk reaches the peak in the p.m. peak hour. Pedestrians using the crosswalk include Safeway customers, users of pay parking located on both sides of 13th Street, and walking to/from other business in this area.

Table 5.1: Pedestrian Activity at Mid-Block Crosswalk on 13th Street

| Movement | PM Peak Hour | | SAT Peak Hour | |
|----------------------|--------------|--------------------|---------------|--------------------|
| | Pedestrians | Vehicles | Pedestrians | Vehicles |
| Northbound Direction | 98 | 570 (EB) | 47 | 310 (EB) |
| Southbound Direction | 118 | 380 (WB) | 48 | 295 (WB) |
| Total | 216 | 950 (2-way) | 95 | 605 (2-way) |

The existing pedestrian volumes at the mid-block crosswalk are comparable to the north-south pedestrian movements at the nearby signalized intersection at St. Georges Avenue where 250 and 220 pedestrians were recorded in the p.m. and Saturday peak hours, respectively.

The future grocery store building entrance will be only 60 metres east of the north-south crosswalk at the signalized 13th Street/Lonsdale Avenue intersection. Also, the existing public pay parking will be removed from this site. With these changes, the pedestrian crossing demand at the mid-block crosswalk is expected to increase by up to 100 pedestrians/hour. The demand will also increase at the adjacent signalized intersections, especially with another high-rise development in the southeast corner of 13th Street/Lonsdale Avenue. Assuming the existing demand to remain unchanged at 216 pedestrians, and including 100 pedestrians from the future site, a total of 316 pedestrians would use the crosswalk in the peak hour.

A warrant analysis was undertaken for the mid-block crossing to assess the need for a traffic control device. The analysis used 2024 p.m. peak hour traffic volumes and noon peak hour pedestrian volumes. This combination of two peak volumes provided a worst-case scenario. The analysis was based on the Transportation Association of Canada's (TAC) recommended methodology given in *Pedestrian Crossing Control Manual*. The following inputs were used:

| | |
|------------------------|---|
| Traffic volumes: | 1,000 veh/h (620 eastbound) in 2024 p.m. hour |
| Pedestrian count: | 316 (30 children, 10 seniors, 276 adult)= 351 EAUs |
| Roadway cross section: | 2 travel lanes each way (with median refuge island) |
| Speed limit: | 50 km/h |

The midblock crosswalk on 13th Street has a median refuge island and the crosswalk is divided into two staggered segments. This allows pedestrians to cross the two eastbound and two westbound lanes separately in two stages. Considering the median refuge, the eastbound and westbound lanes on 13th Street can be considered as separate dual-lane, one-way roadways.

The TAC warrant analysis indicates whether the unsignalized crosswalk needs to be upgraded to the next level or a "special crosswalk" (flashing beacons) or pedestrian-actuated signals or half signals. Based on the TAC nomograph shown in Exhibit 5.3, a three-lane one-way roadway carrying 600 vehicles/hour typically has 230 crossing opportunities per hour. A two-lane one-way roadway, which is the subject case, is expected to have more than 250 crossing opportunities.

Based on the TAC warrant chart shown in Exhibit 5.4, the projected demand of over 300 pedestrians/hour does not trigger the standard warrants for crosswalk upgrade, which is due to the high number of crossing opportunities. The existing crosswalk with the median refuge can therefore be retained. It is however recommended that illumination be improved at the crosswalk location. In addition, overhead crosswalk signs and pedestrian-activated flashing beacons would be desirable to increase driver attention.

The existing separate eastbound left turn lane at the mid-block Safeway access will need to be removed. This will allow an extension of the existing westbound left turn storage at the 13th Street/Lonsdale Avenue intersection.

Exhibit 5.3: TAC Estimated Crossing Opportunities for a 3-Lane One-Way Cross-Section

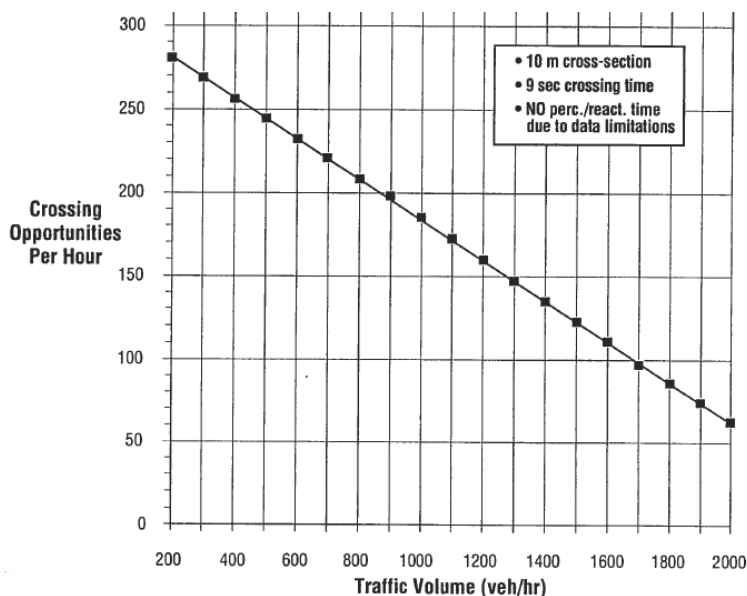
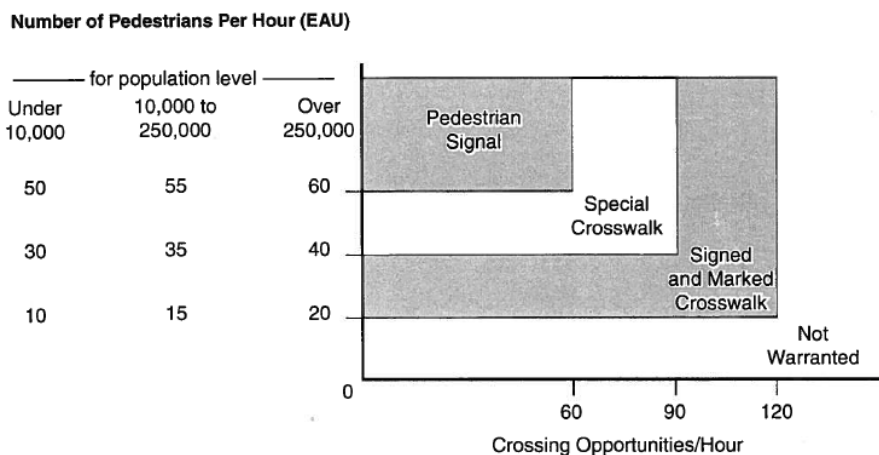


Exhibit 5.4: TAC Pedestrian Crossing Control Warrant Chart



5.2 Existing Bicycle Facilities

In addition to greenways and trail system discussed in the preceding section, 13th Street running along the southern perimeter of the site is part of the City's official bicycle network plan and designated for improvement in the longer term. **Exhibit 5.5** illustrates the current bicycle network in the vicinity of the site as identified in the City's *Long-Term Transportation Plan*.

Exhibits 5.6 and 5.7 illustrate the recently added bike lanes on 13th Street between Lonsdale Avenue and Chesterfield Avenue. This includes a separate eastbound bike lane and a shared westbound bike lane painted green and marked with bike stencils. To the west cyclists share road with motorists.

Exhibit 5.5: Bicycle Network



The City has plans to extend this bike facility to the east of Lonsdale Avenue, i.e., adjacent to the subject site. This will require modification to the existing road cross-section from two travel lanes in each direction to a single eastbound vehicle travel lane plus a dedicated bike lane, and two travel lanes in the westbound direction with the curb lane becoming a shared bike and vehicle lane similar to the segment immediately west of Lonsdale Avenue.

In October 2010, just after bike lanes were added on 13th Street, bicycle volumes were recorded on 13th Street between Lonsdale Avenue and St. Georges Avenue. **Table 5.2** provides a summary of the results indicating the volume of cyclists using the new bike facilities.

Table 5.2: Bicycle Volumes –13th Street east of Lonsdale Avenue

| Direction | PM Peak Hour | SAT Peak Hour |
|--------------|--------------|---------------|
| Eastbound | 3 | 6 |
| Westbound | 3 | 3 |
| Total | 6 | 9 |

Exhibit 5.6: East-West Bicycle Facilities on 13th Street

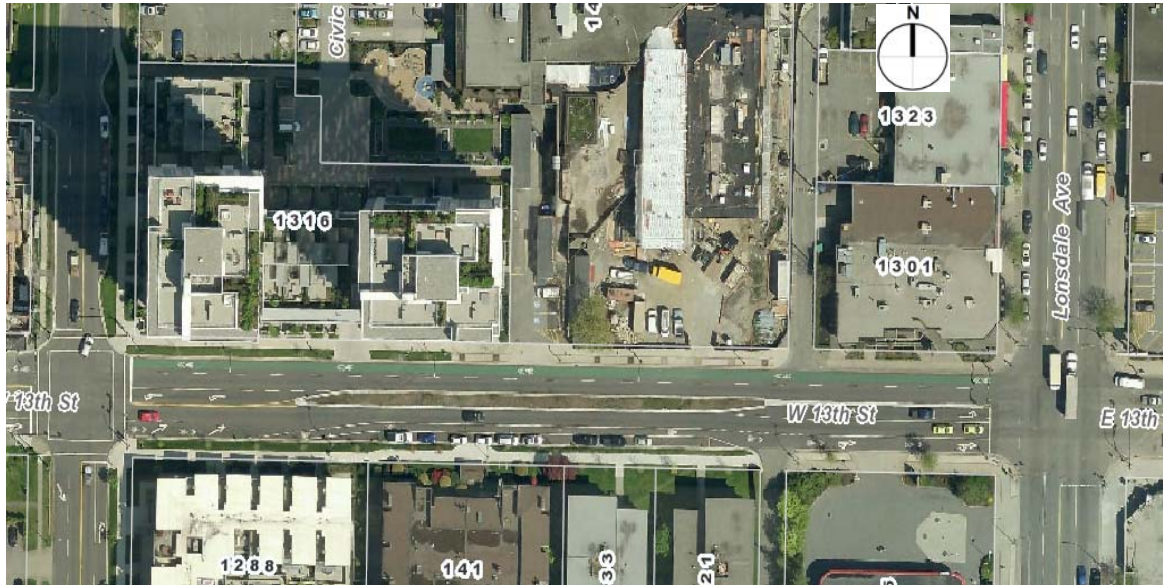


Exhibit 5.7: Shared Bike Lane on 13th Street west of Lonsdale Avenue



Currently, bicycle activity at the study intersections is very low to none. The volume of cyclists on 13th Street and other roads in this area are expected to be higher in the summer months. In addition, the new facilities added by the City will attract more users once cyclists become aware of the new facilities provided and a more continuous link is established. Residential densification in the area will also contribute to this growth.

5.3 Existing Transit Services

A number of regular transit routes currently provide service the site and the adjacent area. They are as follows:

- (a) *Route 229 - Westlynn/Lonsdale Quay/Phibbs Exchange* – runs between Lonsdale Quay Transit Exchange/SeaBus Terminal to and Phibbs Exchange traveling northbound and southbound via Lonsdale Avenue adjacent to the site. Service is provided every 15 minutes during peak hours, every 30 minutes throughout the day, and on an hourly basis after 9:00 p.m.
- (b) *Route 230 - Upper Lonsdale/Lonsdale Quay* – a north-south route connecting Upper Lonsdale to Lonsdale Quay. It travels via Lonsdale Avenue adjacent to the site providing service in both northbound and southbound directions. Some of the peak hour buses have their north terminus at 23rd Street while other buses continue further north to Rockland Road. Service is provided every 15 minutes during peak hours and every 30 minutes at other times. Additional limited stop services are provided during the peak hours up to 23rd Street.
- (c) *Route 232 - Grouse Mountain/Phibbs Exchange* - runs between Phibbs Exchange just west of Ironworkers Memorial Bridge through to Grouse Mountain via Edgemont Village near Capilano Suspension Bridge. In the vicinity of the site this bus travels via Lonsdale Avenue to and from the south. Service is provided every 15 minutes during peak hours, every 30 minutes at other times.
- (d) *Route 240 - 15th Street/Vancouver* – connects North Vancouver to Downtown Vancouver running east-west via 15th Street in the vicinity of the site. Service is provided approximately every 10 minutes during peak hours, every 15 minutes during non peak hours throughout the week.
- (e) *Route 242 - Upper Lonsdale/Vancouver* – another route from Downtown Vancouver that runs eastbound via Marine Drive to Lonsdale Quay in North Vancouver and then northbound via Lonsdale Avenue to Rockland Road in the north and returns following the same route. On weekends early morning services are provided every 30 minutes.
- (f) *Route 255 - Capilano University/Dundarave* - runs between Capilano University in the east via Marine Drive to Dundarave in the west. In the vicinity of the site it travels east-west via 15th Street. Service is provided on a half-hourly basis throughout the day seven days a week.

In addition, N24 provides night time service to the area. **Exhibit 5.6** illustrates the transit network, as defined in the City's *Transportation Plan*.

Based on the TransLink's *North Shore Area Transit Plan 2040 Transit Network Vision* map, conceptual alignments of a future Rapid Transit line is shown along Lonsdale Avenue and a Frequent Transit service is shown along 13th Street adjacent to the subject site.

The existing bus stops nearest to the site are located at the following locations:

- Northbound Lonsdale Avenue far side 13th Street (*Routes #229, 230, 232, 242, N24*)
- Southbound Lonsdale Avenue far side 13th Street (*Routes #229, 230, 232, 242, N24*)

- Southbound Lonsdale Avenue far side 15th Street. (*Routes #229, 230, 232, 240, 242, N24*)
- Eastbound 15th Street far side Lonsdale Avenue (*Routes #240, 255*)
- Westbound 15th Street far side Lonsdale Avenue (*Routes #240, 255*)

All of the above stops are within the typically walking distance threshold of 400 metres to be considered for transit accessibility. Given the number of routes, service frequency and walking distance, the subject site has access to good transit service. At the existing Safeway site, approximately 45% of the trips are non-vehicular trips, i.e., walk, bike and transit trips. In a transit-oriented development (TOD), the percentage of vehicular trip generation is typically lower, which is also expected to be the case for the future development.

Exhibit 5.6: Transit Network



5.4 Non-Auto Trip Generation

The trip generation for the non-auto modes was also undertaken for the proposed development. This includes walk, bike and transit trips to and from the development. Surveys conducted at the existing Safeway site indicate approximately 45% of the trips are made by non-vehicular modes, i.e., walk, bike and transit. This existing mode split will also be applicable to the near term conditions for the redeveloped site.

The percentage of non-vehicular trips in the general area is expected to increase in the future with the implementation of the City's *Long-Term Transportation Plan* and transit improvements. This is expected to cause travel behaviour changes in the municipality. Also, depending on the specific TDM measures and the commercial uses in this development, a higher percentage of walk trips are

expected. The application of a mode split similar to existing conditions provides a base estimate of non-vehicular traffic and avoids any understating of vehicular traffic impact.

The City's *Long-term Transportation Plan* indicates the existing mode split of the total daily trips in the Central Lonsdale neighbourhood. The 2008 report indicates 50% auto trips, 25% transit trips, 23% walk trips and 2% bike trips in this neighbourhood which includes the subject site.

Based on the existing mode split and near term conditions, a slightly revised mode split was considered for the opening year of the development. The assumed mode split and the expected non-auto trip generation for the proposed development is presented in **Table 5.3**.

Table 5.3: Estimated Non-Auto Trip generation

| Mode | % | PM Peak Hour | | | SAT Peak Hour | | |
|---------------------------|-------------|--------------|------------|------------|---------------|------------|------------|
| | | Total | In | Out | Total | In | Out |
| Total Person Trips | 100% | 1,088 | 526 | 562 | 1,178 | 626 | 551 |
| Person trips by auto | 55% | 598 | 289 | 309 | 648 | 345 | 303 |
| Person walk trips | 25% | 272 | 132 | 140 | 294 | 157 | 138 |
| Person trips by transit | 18% | 196 | 95 | 101 | 212 | 113 | 99 |
| Person bike trips | 2% | 22 | 11 | 11 | 24 | 13 | 11 |

The walk and bike trips will be distributed along a number of alternative routes and in the inbound and outbound directions of travel.

Based on the trip distribution established for the site traffic, the site-generated pedestrian volumes along the key routes are shown in Table 5.4. Pedestrian volumes will be spread over a number of alternative routes, sidewalks and crossing locations leading to transit stops and other destinations. The resulting pedestrian volumes will not be concentrated at any location. The volume on a crosswalk is expected to be no more than 100 pedestrians per hour, which translates to only two pedestrians per minute of signal cycle. The development will be located amidst a pedestrian-friendly environment with sidewalks provided on both sides of all roads and crosswalks at all signalized intersections. The width of these facilities and corner holding areas are adequate to meet the anticipated demand. Pedestrians are observed to travel mostly at unimpeded speeds which may be slightly impeded during the summer months.

Table 5.4: Pedestrian Trip Distribution

| Sector | %Distribution | PM Peak Hour | | SAT Peak Hour | |
|-----------------------|---------------|--------------|------------|---------------|------------|
| | | In | Out | In | Out |
| South on Lonsdale Ave | 14% | 31 | 33 | 37 | 33 |
| North on Lonsdale Ave | 19% | 44 | 47 | 52 | 46 |
| West on 13 Street | 19% | 43 | 45 | 51 | 45 |
| East on 13 Street | 25% | 57 | 61 | 68 | 60 |
| North on St Georges | 11% | 26 | 28 | 31 | 27 |
| South on St Georges | 11% | 26 | 28 | 31 | 27 |
| Total | 100% | 226 | 241 | 269 | 237 |

Numbers include transit trips

The development is projected to generate approximately 200 transit trips in the peak hour. Presently there are five different transit routes in the immediate vicinity of the site. Assuming a 15 minute headway between buses, and all five buses operating in the two opposite directions of

travel, the net increase in ridership will be only five passengers per bus. The site will therefore not trigger the need to add new routes or additional buses.

Improvements are recommended to the existing northbound bus stop on Lonsdale Avenue on the far side of 13th Street. An increased passenger waiting area, a shelter with transit information, etc. at this location would increase the overall attractiveness of transit service.

5.4.1 PEDESTRIAN LEVEL OF SERVICE

The pedestrian level of service at the key nodes of activity was also analyzed. This included the following three intersections in the immediate vicinity of the site:

14th Street/Lonsdale Avenue (signalized crosswalks);

14th Street/North-South lane (unsignalized, marked east-west crosswalks on lane); and

14th Street/St. Georges Avenue (pedestrian-actuated special crosswalks on St. Georges Avenue).

The analysis followed the *Highway Capacity Manual 2010* methodology, as applied in the current Version 8.0 of the Synchro software. The analysis results provided in Appendix E indicate the level of service will remain satisfactory at LoS B or better for all crosswalks in the 2024 p.m. peak hour. At the 14th Street/Lonsdale Avenue intersection there will be a slight change from LoS A to LoS B for the north-south crosswalk on 14th Street. The performance will remain unchanged at LoS A at the other two intersections, i.e., the North-South lane and St. Georges Avenue. The overall quality of service for the pedestrian network will therefore remain satisfactory.

To facilitate the movement of pedestrians and cyclists, the following should be considered:

- Sidewalks should be continued across accesses instead of curb returns with letdowns;
- Transit shelter for northbound buses is desirable adjacent to this site;
- Accesses and loading bay corners should be kept clear of sight line obstructions;
- Illumination is recommended for the north-south pedestrian corridor and the mid-block crosswalk, plus pedestrian-activated flashing beacons and overhead signs.

The development will enhance the site frontages and create pedestrian-only corridors/plaza and remove existing vehicular accesses on 13th Street and 14th Street that will enhance walking conditions in this area.

There are limited dedicated bicycle facilities in the vicinity of the site and cyclists share roadways with motorists. The City has recently installed bike lanes on 13th Street between Lonsdale Avenue and Chesterfield Avenue and is planning to extend these to St. Georges Avenue in the east in conjunction with this development. This will improve facilities and promote cycling in this area.

With the proposed removal and consolidation of site accesses, movement of pedestrians and cyclists will be more convenient. The existing facilities near the site will be adequate to accommodate the incremental volume of walk and bike trips from this development. The extension of bike lanes on 13th Street adjacent to this site can be implemented in conjunction with this development.

6. SUMMARY AND RECOMMENDATIONS

Based on the traffic impact study for the proposed development, development (site) generated traffic will have minimal impact on the performance of the study area intersections relative to the background conditions. Accordingly, there are no mitigation measures identified in relation to the development's traffic impacts. Therefore, no deterioration in safety conditions for pedestrians and cyclists is expected.

The key findings and the recommendations are as follows.

(a) Intersections and Roadways:

- The existing road network and intersection in the vicinity of the site operate satisfactorily within their capacity. All intersections analyzed are expected to operate at good levels of service through to the 2024 horizon year. No capacity improvements are therefore recommended.
- A total of approximately 440 and 370 vehicular movements were recorded at the existing site accesses in the weekday p.m. and Saturday mid-day peak hours. This includes traffic generated by Safeway and other uses on this site (public pay parking, pet food mart) and neighbouring businesses fronting Lonsdale Avenue, as well as through traffic using an existing North-South lane through the site.
- Only 55% of trips to the existing Safeway are vehicular trips while the remaining 45% are walk, bike and transit trips.
- The proposed development is expected to generate a total of 1,088 person trips in the p.m. peak hour and 1,178 person trips in the Saturday peak hour. This compares to 596 and 545 person trips generated by the existing Safeway in the two peak hours.
- The vehicular traffic volumes are not expected to increase significantly due to a high proportion of internal trips in this mixed-use development, and also due to the removal of the public pay parking, and through traffic using the existing lane.
- The vehicular traffic from the redeveloped site is not expected to have any noticeable impact on the performance of the intersections in the vicinity of the site. As such, no capacity improvements will be triggered as a result of this development.
- It will be possible to reconfigure 14th Street from the existing one-way eastbound to two-way operation without widening the pavement, this will however add traffic on this road.
- The redeveloped site will no longer require the existing mid-block access on 13th Street, and the corresponding left turn lane on 13th Street will need to be removed. This will enable an extension of the existing westbound left turn lane on 13th Street at Lonsdale Avenue.

(b) Pedestrians, Cyclists and Transit:

- A significant percentage of trips to the existing Safeway are non-vehicular, i.e., walk, bike and transit trips. Approximately 45% of the trips are non-vehicular traffic.
- The proposed development is expected to generate up to 300 pedestrians in the peak hour. These trips will be distributed along a number of routes and in the inbound and outbound

directions. The existing pedestrian facilities will be adequate to accommodate the demand. Suitable linkages between the proposed on-site and external facilities are recommended.

- The future site is projected to generate a total of 200 transit trips in the peak hour. Presently there are five different transit routes in the immediate vicinity of the site. Assuming a 15-minute headway between buses, and all five buses operating in the two opposite directions of travel, the net increase in ridership will be only five passengers per bus. The site will therefore not trigger the need to add new routes or additional buses.
- The existing mid-block pedestrian crosswalk on 13th Street should be retained at the current location with improved illumination. Overhead crosswalk signs and pedestrian activated flashing beacons are also recommended to increase driver attention.
- The proposed bike parking spaces and end of trip facilities will meet the City's bylaw requirements.
- The City requested bike lanes on 13th Street adjacent to the site can be achieved without requiring pavement widening.
- Improvements are recommended at the existing northbound bus stop on Lonsdale Avenue on the far side of 13th Street. A passenger shelter and associated amenities will improve the overall attractiveness of transit services.

(c) Site Access:

- It is recommended that the access on 13th Street be restricted to left-in/right-in/right-out movements. Signage is recommended to indicate right turn permitted from the access. A separate eastbound left turn lane is recommended on 13th Street at the access.
- The proposed access via the North-South lane will be satisfactory. The configuration of the lane and access should be designed to accommodate WB-17 trucks arriving for delivery purposes.
- Signage should be provided at accesses to indicate the location of retail customer and residential visitor parking.
- Delivery truck access via 14th Street and the North-South lane should be restricted to pre-defined hours to minimize interactions with pedestrians near the 14th Street/Lonsdale Avenue intersection.

(d) Parking and Loading:

- A total of 926 parking spaces are proposed which meets the City's Zoning Bylaw.
- The proposed parking supply and loading arrangements are considered satisfactory.

Appendix A

Traffic Counts

Exhibit A.1: Summary of 2010 Peak Hour Traffic Volumes

| Intersection | Period | Total Intersection | Date, Peak Hour | |
|------------------------|--------|--------------------|------------------------------|---------------|
| 15 Street/Lonsdale Ave | AM | 1,430 | Wednesday, February 10, 2010 | 08:00 - 09:00 |
| | MD | 1,885 | Friday, January 29, 2010 | 12:00 - 13:00 |
| | PM | 1,965 | Thursday, February 25, 2010 | 15:00 - 16:00 |
| | MD-W | 1,890 | Saturday, January 30, 2010 | 12:00 - 13:00 |
| 14 Street/Lonsdale Ave | AM | 1,067 | Tuesday, September 14, 2010 | 08:00 - 09:00 |
| | MD | 1,535 | Thursday, September 09, 2010 | 12:00 - 13:00 |
| | PM | 1,688 | Friday, April 30, 2010 | 16:00 - 17:00 |
| | MD-W | 1,560 | Saturday, April 24, 2010 | 12:00 - 13:00 |
| 13 Street/Lonsdale Ave | AM | 1,861 | Tuesday, September 21, 2010 | 08:00 - 09:00 |
| | MD | 2,042 | Tuesday, September 14, 2010 | 12:45 - 13:45 |
| | PM | 2,227 | Monday, September 20, 2010 | 16:45 - 17:45 |
| | MD-W | 2,042 | Saturday, February 20, 2010 | 12:45 - 13:45 |
| 13 Street/St. Georges | AM | 1,078 | Tuesday, September 28, 2010 | 08:00 - 09:00 |
| | MD | 1,203 | Friday, October 22, 2010 | 11:00 - 12:00 |
| | PM | 1,654 | Wednesday, October 20, 2010 | 17:00 - 18:00 |
| | MD-W | 1,184 | Saturday, October 23, 2010 | 12:00 - 13:00 |

Exhibit A.2: 2012 Pedestrian Volumes at Study Intersections

| Intersection | Crossing | PM Peak Hour | MD-W Peak Hour |
|----------------------------|----------|--------------|----------------|
| E 11 Street/Lonsdale Ave | North | 69 | 60 |
| | South | 30 | 26 |
| | West | 207 | 179 |
| | East | 108 | 94 |
| E 13 Street/Lonsdale Ave | North | 40 | 35 |
| | South | 72 | 63 |
| | West | 24 | 21 |
| | East | 36 | 32 |
| E 13 Street/St Georges Ave | North | 112 | 97 |
| | South | 56 | 49 |
| | West | 112 | 97 |
| | East | 140 | 122 |
| E 13 Street/St Andrews Ave | North | 4 | 4 |
| | South | 20 | 18 |
| | West | 8 | 7 |
| | East | 12 | 11 |
| E 14 Street/St Georges Ave | North | 21 | 19 |
| | South | 36 | 32 |
| | West | 66 | 58 |
| | East | 0 | 0 |
| E 14 Street/Lonsdale Ave | North | 216 | 187 |
| | South | 144 | 125 |

TRANSPORTATION STUDY FOR THE PROPOSED DEVELOPMENT AT 13TH STREET/LONSDALE, CITY OF NORTH VANCOUVER, BC

| | | | |
|------------------------------|-------|-----|-----|
| | West | 0 | 0 |
| | East | 87 | 76 |
| E 15 Street/Lonsdale Ave | North | 196 | 170 |
| | South | 276 | 239 |
| | West | 372 | 322 |
| | East | 396 | 343 |
| | | | |
| E 15 Street/St Georges Ave | North | 24 | 14 |
| | South | 84 | 53 |
| | West | 96 | 44 |
| | East | 84 | 48 |
| E 15 Street/St Andrews Ave | North | 7 | 7 |
| | South | 17 | 15 |
| | West | 15 | 13 |
| | East | 17 | 15 |
| E 13 Street/Chesterfield Ave | North | 15 | 13 |
| | South | 33 | 29 |
| | West | 12 | 11 |
| | East | 60 | 52 |

Appendix B

Intersection Analysis – Background Traffic

Background - Intersection Capacity Analysis (2014)

| Intersection | Scenario | Control Type | Measure | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | Overall Intersection |
|-----------------------------|------------------|--------------|---------------------|-----------|------|------|-----------|------|------|------------|------|------|------------|------|------|----------------------|
| Movement | | | | L | T | R | L | T | R | L | T | R | L | T | R | |
| 13th St. / Chesterfield Ave | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 111 | 531 | 56 | 43 | 262 | 86 | 40 | 303 | 123 | 31 | 247 | 49 | 1882 |
| | | | v/c | 0.31 | 0.45 | | 0.16 | 0.27 | | | 0.61 | 0.20 | | 0.32 | | 0.61 |
| | | | Delay (s) | 13 | 11 | | 11 | 8 | | | 17 | 3 | | 10 | | 11.1 |
| | | | LOS | B | B | | B | A | | | B | A | | B | | B |
| | | | 50th Queue Length* | 6 | 18 | | 2 | 7 | | | 25 | 0 | | 9 | | |
| | | | 95th Queue Length** | 17 | 32 | | 8 | 16 | | | 45 | 8 | | 16 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 139 | 250 | 25 | 40 | 265 | 96 | 34 | 201 | 71 | 18 | 213 | 83 | 1435 |
| | | | v/c | 0.39 | 0.21 | | 0.10 | 0.28 | | | 0.47 | 0.12 | | 0.32 | | 0.47 |
| | | | Delay (s) | 13 | 8 | | 9 | 7 | | | 15 | 3 | | 9 | | 9.3 |
| | | | LOS | B | A | | A | A | | | B | A | | A | | A |
| | | | 50th Queue Length* | 7 | 6 | | 2 | 6 | | | 14 | 0 | | 7 | | |
| | | | 95th Queue Length** | 21 | 14 | | 7 | 15 | | | 31 | 6 | | 15 | | |
| Lonsdale Ave / 11th St. | PM | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 31 | 0 | 0 | 59 | 15 | 460 | 19 | 37 | 522 | 31 | 1174 |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.34 | | | 0.43 | | 0.43 |
| | | | Delay (s) | | | 0 | | 0 | | | 11 | | | 14 | | 11.7 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 0 | | | 20 | | | 31 | | |
| | | | 95th Queue Length** | | | 0 | | 0 | | | 29 | | | 46 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 28 | 19 | 0 | 28 | 9 | 429 | 34 | 34 | 414 | 15 | 1010 |
| | | | v/c | | | 0.05 | | 0.10 | | | 0.32 | | | 0.33 | | 0.33 |
| | | | Delay (s) | | | 0 | | 10 | | | 10 | | | 13 | | 11.2 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 2 | | | 18 | | | 20 | | |
| | | | 95th Queue Length** | | | 0 | | 8 | | | 27 | | | 34 | | |
| Lonsdale Ave / 13th St. | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 149 | 385 | 135 | 125 | 231 | 33 | 70 | 412 | 152 | 49 | 492 | 74 | 2307 |
| | | | v/c | 0.40 | 0.56 | | 0.38 | 0.46 | 0.08 | | 0.46 | 0.24 | | 0.53 | | 0.56 |
| | | | Delay (s) | 16 | 20 | | 17 | 23 | 7 | | 10 | 1 | | 8 | | 13.3 |
| | | | LOS | B | C | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 26 | | 10 | 25 | 0 | | 12 | 0 | | 4 | | |
| | | | 95th Queue Length** | 22 | 40 | | 19 | 43 | 5 | | 17 | 2 | | 22 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 149 | 265 | 56 | 81 | 254 | 95 | 69 | 405 | 149 | 13 | 499 | 162 | 2197 |
| | | | v/c | 0.43 | 0.36 | | 0.19 | 0.51 | 0.20 | | 0.47 | 0.23 | | 0.54 | | 0.54 |
| | | | Delay (s) | 17 | 19 | | 12 | 23 | 5 | | 11 | 2 | | 7 | | 11.9 |
| | | | LOS | B | B | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 15 | | 6 | 28 | 0 | | 14 | 0 | | 22 | | |
| | | | 95th Queue Length** | 22 | 25 | | 13 | 48 | 9 | | 20 | 2 | | 10 | | |
| Lonsdale Ave / 14th St. | PM | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 15 | | 39 | | 619 | 81 | 92 | 572 | | 1418 |
| | | | v/c | | | | 0.14 | | | | 0.45 | | | 0.56 | | 0.56 |
| | | | Delay (s) | | | | 9 | | | | 8 | | | 8 | | 7.7 |
| | | | LOS | | | | A | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | 1 | | | | 20 | | | 18 | | |
| | | | 95th Queue Length** | | | | 9 | | | | 23 | | | 18 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 36 | | 36 | | 627 | 129 | 113 | 638 | | 1579 |
| | | | v/c | | | | 0.17 | | | | 0.49 | | | 0.69 | | 0.69 |
| | | | Delay (s) | | | | 12 | | | | 10 | | | 12 | | 11.2 |
| | | | LOS | | | | B | | | | B | | | B | | B |
| | | | 50th Queue Length* | | | | 4 | | | | 30 | | | 30 | | |
| | | | 95th Queue Length** | | | | 12 | | | | 30 | | | 32 | | |
| Lonsdale Ave / 15th St. | PM | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 54 | 150 | 64 | 86 | 166 | 93 | 39 | 558 | 51 | 63 | 669 | 56 | 2049 |
| | | | v/c | | 0.34 | | | 0.46 | | | 0.50 | | | 0.62 | | 0.62 |
| | | | Delay (s) | | 18 | | | 19 | | | 4 | | | 14 | | 12.3 |
| | | | LOS | | B | | | B | | | A | | | B | | B |
| | | | 50th Queue Length* | | 14 | | | 18 | | | 3 | | | 38 | | |
| | | | 95th Queue Length** | | 23 | | | 30 | | | 15 | | | 55 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 47 | 126 | 64 | 93 | 122 | 105 | 77 | 495 | 71 | 80 | 500 | 145 | 1925 |
| | | | v/c | | 0.30 | | | 0.44 | | | 0.57 | | | 0.63 | | 0.63 |
| | | | Delay (s) | | 16 | | | 19 | | | 7 | | | 14 | | 12.6 |
| | | | LOS | | B | | | B | | | A | | | B | | B |
| | | | 50th Queue Length* | | 11 | | | 17 | | | 29 | | | 33 | | |
| | | | 95th Queue Length** | | 19 | | | 28 | | | 11 | | | 50 | | |
| St Georges / 13th St. | PM | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 62 | 374 | 38 | 35 | 194 | 52 | 87 | 34 | 137 | 104 | 95 | 116 | 1328 |
| | | | v/c | 0.15 | 0.58 | 0.07 | 0.10 | 0.43 | | | 0.33 | | | 0.38 | | 0.58 |
| | | | Delay (s) | 10 | 19 | 6 | 9 | 17 | | | 8 | | | 10 | | 13.3 |
| | | | LOS | A | B | A | A | B | | | A | | | B | | B |
| | | | 50th Queue Length* | 4 | 31 | 0 | 2 | 22 | | | 5 | | | 9 | | |
| | | | 95th Queue Length** | 9 | 65 | 5 | 6 | 39 | | | 13 | | | 19 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 52 | 241 | 70 | 25 | 232 | 70 | 139 | 400 | 29 | 9 | 242 | 10 | 1519 |
| | | | v/c | 0.14 | 0.38 | 0.13 | 0.05 | 0.54 | | | 0.61 | | | 0.23 | | 0.61 |
| | | | Delay (s) | 10 | 16 | 5 | 9 | 19 | | | 18 | | | 13 | | 16.0 |
| | | | LOS | A | B | A | A | B | | | B | | | B | | B |
| | | | 50th Queue Length* | 3 | 18 | 0 | 2 | 28 | | | 29 | | | 11 | | |
| | | | 95th Queue Length** | 8 | 41 | 7 | 5 | 50 | | | 46 | | | 20 | | |
| St Georges / 14th St. | PM | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 88 | | 86 | | | | 0 | 139 | | | 361 | 0 | 674 |
| | | | v/c | 0.23 | | 0.18 | | | | | 0.09 | | | 0.23 | | 0.23 |
| | | | Delay (s) | 16 | | 13 | | | | | 0 | | | 0 | | 3.80 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 7 | | 5 | | | | | 0 | | | 0 | | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 74 | | 117 | | | | 0 | 235 | | | 320 | 0 | 746 |
| | | | v/c | 0.21 | | 0.22 | | | | | 0.15 | | | 0.20 | | 0.22 |
| | | | Delay (s) | 17 | | 13 | | | | | 0 | | | 0 | | 3.70 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 6 | | 6 | | | | | 0 | | | 0 | | |
| St Georges / 15th St. | PM | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 33 | 128 | 49 | 41 | 152 | 45 | 16 | 111 | 74 | 74 | 288 | 37 | 1048 |
| | | | v/c | | 0.37 | 0.12 | | 0.44 | 0.10 | | 0.20 | 0.13 | | 0.58 | 0.07 | 0.58 |
| | | | Delay (s) | | 14 | 5 | | 15 | 5 | | 8 | 3 | | 13 | 5 | 11.1 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 8 | 0 | | 9 | 0 | | 5 | 0 | | 16 | 0 | |
| | | | 95th Queue Length** | | 25 | 6 | | 30 | 5 | | 15 | 5 | | 45 | 4 | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 29 | 157 | 49 | 12 | 140 | 21 | 41 | 160 | 45 | 45 | 370 | 58 | 1127 |
| | | | v/c | | 0.35 | 0.10 | | 0.27 | 0.04 | | 0.28 | 0.07 | | 0.51 | 0.09 | 0.51 |
| | | | Delay (s) | | 14 | 5 | | 13 | 7 | | 8 | 3 | | 11 | 5 | 10.3 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 9 | 0 | | 7 | 0 | | 8 | 0 | | 19 | 1 | |
| | | | 95th Queue Length** | | 30 | 6 | | 25 | 4 | | 22 | 4 | | 49 | 6 | |
| St Andrews / 13th St. | PM | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 16 | 340 | 33 | 21 | 197 | 8 | 45 | 144 | 70 | 12 | 49 | 45 | 980 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.79 | 0.79 | 0.79 | 0.31 | 0.31 | 0.31 | 0.79 |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 45 | 45 | 45 | 19 | 19 | 19 | 14.30 |
| | | | LOS | A | A | A | A | A | A | A | E | E | C | C | C | B |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | 0 | 0 | 1 | 1 | 1 | 51 | 51 | 51 | 10 | 10 | 10 | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 8 | 188 | 3 | 25 | 246 | 5 | 16 | 16 | 25 | 8 | 41 | 20 | 601 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.13 | 0.13 | 0.13 | 0.16 | 0.16 | 0.16 | 0.16 |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 14 | 14 | 14 | 14 | 14 | 14 | 3.50 |
| | | | LOS | A | A | A | A | A | A | B | B | B | B | B | B | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | 0 | 0 | 1 | 1 | | | | | | | | |

Background - Intersection Capacity Analysis (2024)

| Intersection | Scenario | Control Type | Measure | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | Overall Intersection |
|-----------------------------|------------------|--------------|---------------------|-----------|------|------|-----------|------|------|------------|------|------|------------|------|------|----------------------|
| Movement | | | | L | T | R | L | T | R | L | T | R | L | T | R | |
| 13th St. / Chesterfield Ave | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 117 | 556 | 58 | 45 | 274 | 90 | 42 | 318 | 129 | 32 | 260 | 52 | 1973 |
| | | | v/c | 0.33 | 0.47 | | 0.17 | 0.28 | | | 0.64 | 0.20 | | 0.33 | | 0.64 |
| | | | Delay (s) | 13 | 12 | | 12 | 8 | | | 18 | 3 | | 10 | | 11.4 |
| | | | LOS | B | B | | B | A | | | B | A | | B | | B |
| | | | 50th Queue Length* | 7 | 19 | | 3 | 8 | | | 26 | 0 | | 10 | | |
| | | | 95th Queue Length** | 18 | 33 | | 8 | 16 | | | 48 | 8 | | 18 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 146 | 261 | 26 | 42 | 278 | 100 | 36 | 211 | 74 | 19 | 224 | 88 | 1505 |
| | | | v/c | 0.42 | 0.22 | | 0.11 | 0.29 | | | 0.49 | 0.12 | | 0.33 | | 0.49 |
| | | | Delay (s) | 14 | 8 | | 9 | 7 | | | 15 | 3 | | 9 | | 9.5 |
| | | | LOS | B | A | | A | A | | | B | A | | A | | A |
| | | | 50th Queue Length* | 8 | 6 | | 2 | 7 | | | 15 | 0 | | 7 | | |
| | | | 95th Queue Length** | 22 | 14 | | 7 | 16 | | | 33 | 6 | | 15 | | |
| Lonsdale Ave / 11th St. | PM | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 32 | 0 | 0 | 61 | 16 | 482 | 19 | 39 | 547 | 32 | 1228 |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.36 | | | 0.45 | | 0.45 |
| | | | Delay (s) | | | 0 | | 0 | | | 11 | | | 15 | | 12.0 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 0 | | | 21 | | | 33 | | |
| | | | 95th Queue Length** | | | 0 | | 0 | | | 31 | | | 48 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 29 | 19 | 0 | 29 | 10 | 450 | 36 | 36 | 434 | 16 | 1059 |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.34 | | | 0.35 | | 0.35 |
| | | | Delay (s) | | | 0 | | 9 | | | 10 | | | 14 | | 11.5 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 2 | | | 19 | | | 21 | | |
| | | | 95th Queue Length** | | | 0 | | 8 | | | 29 | | | 36 | | |
| Lonsdale Ave / 13th St. | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 157 | 403 | 142 | 130 | 241 | 35 | 74 | 433 | 158 | 52 | 518 | 78 | 2421 |
| | | | v/c | 0.43 | 0.59 | | 0.40 | 0.48 | 0.08 | | 0.50 | 0.25 | | 0.56 | | 0.59 |
| | | | Delay (s) | 17 | 21 | | 18 | 23 | 7 | | 11 | 1 | | 10 | | 14.0 |
| | | | LOS | B | C | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 28 | | 10 | 26 | 0 | | 13 | 0 | | 7 | | |
| | | | 95th Queue Length** | 23 | 42 | | 19 | 45 | 6 | | 18 | 2 | | 27 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 157 | 277 | 58 | 84 | 265 | 100 | 73 | 425 | 156 | 14 | 524 | 170 | 2303 |
| | | | v/c | 0.46 | 0.37 | | 0.19 | 0.53 | 0.21 | | 0.51 | 0.24 | | 0.57 | | 0.57 |
| | | | Delay (s) | 18 | 19 | | 12 | 24 | 5 | | 12 | 2 | | 7 | | 12.2 |
| | | | LOS | B | B | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 16 | | 6 | 29 | 0 | | 15 | 0 | | 11 | | |
| | | | 95th Queue Length** | 23 | 26 | | 13 | 50 | 9 | | 21 | 2 | | 13 | | |
| Lonsdale Ave / 14th St. | PM | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 16 | | 40 | | 651 | 85 | 95 | 601 | | 1488 |
| | | | v/c | | | | 0.14 | | | | 0.47 | | | 0.60 | | 0.60 |
| | | | Delay (s) | | | | 9 | | | | 8 | | | 8 | | 7.8 |
| | | | LOS | | | | A | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | 2 | | | | 20 | | | 19 | | |
| | | | 95th Queue Length** | | | | 9 | | | | 23 | | | 16 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 38 | | 37 | | 660 | 135 | 118 | 670 | | 1658 |
| | | | v/c | | | | 0.18 | | | | 0.51 | | | 0.74 | | 0.74 |
| | | | Delay (s) | | | | 12 | | | | 10 | | | 13 | | 11.6 |
| | | | LOS | | | | B | | | | A | | | B | | B |
| | | | 50th Queue Length* | | | | 4 | | | | 26 | | | 29 | | |
| | | | 95th Queue Length** | | | | 13 | | | | 31 | | | 36 | | |
| Lonsdale Ave / 15th St. | PM | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 56 | 158 | 67 | 91 | 174 | 97 | 41 | 586 | 54 | 66 | 702 | 58 | 2150 |
| | | | v/c | | 0.36 | | | 0.49 | | | 0.53 | | | 0.66 | | 0.66 |
| | | | Delay (s) | | 18 | | | 20 | | | 5 | | | 15 | | 13.0 |
| | | | LOS | | B | | | C | | | A | | | B | | B |
| | | | 50th Queue Length* | | 15 | | | 20 | | | 4 | | | 41 | | |
| | | | 95th Queue Length** | | 24 | | | 32 | | | 19 | | | 60 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 50 | 132 | 67 | 97 | 128 | 110 | 81 | 520 | 75 | 84 | 524 | 153 | 2021 |
| | | | v/c | | 0.32 | | | 0.47 | | | 0.61 | | | 0.67 | | 0.67 |
| | | | Delay (s) | | 17 | | | 19 | | | 7 | | | 15 | | 13.1 |
| | | | LOS | | B | | | B | | | A | | | B | | B |
| | | | 50th Queue Length* | | 12 | | | 18 | | | 3 | | | 36 | | |
| | | | 95th Queue Length** | | 21 | | | 29 | | | 13 | | | 55 | | |
| St Georges / 13th St. | PM | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 65 | 391 | 39 | 37 | 202 | 54 | 91 | 36 | 144 | 108 | 100 | 120 | 1387 |
| | | | v/c | 0.16 | 0.60 | 0.07 | 0.10 | 0.45 | | | 0.35 | | | 0.39 | | 0.60 |
| | | | Delay (s) | 10 | 20 | 6 | 9 | 17 | | | 8 | | | 10 | | 13.6 |
| | | | LOS | A | B | A | A | B | | | A | | | B | | B |
| | | | 50th Queue Length* | 4 | 32 | 0 | 2 | 23 | | | 5 | | | 9 | | |
| | | | 95th Queue Length** | 10 | 68 | 5 | 6 | 41 | | | 14 | | | 20 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 54 | 252 | 73 | 26 | 242 | 74 | 146 | 420 | 30 | 8 | 255 | 10 | 1590 |
| | | | v/c | 0.15 | 0.40 | 0.13 | 0.06 | 0.57 | | | 0.65 | | | 0.24 | | 0.65 |
| | | | Delay (s) | 10 | 17 | 5 | 9 | 19 | | | 19 | | | 13 | | 16.4 |
| | | | LOS | A | B | A | A | B | | | B | | | B | | B |
| | | | 50th Queue Length* | 3 | 19 | 0 | 2 | 30 | | | 31 | | | 12 | | |
| | | | 95th Queue Length** | 9 | 43 | 7 | 5 | 53 | | | 49 | | | 21 | | |
| St Georges / 14th St. | PM | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 91 | | 90 | | | | 0 | 146 | | | 377 | 0 | 704 |
| | | | v/c | 0.25 | | 0.19 | | | | | 0.09 | | | 0.24 | | 0.25 |
| | | | Delay (s) | 17 | | 14 | | | | | 0 | | | 0 | | 4.00 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 7 | | 5 | | | | | 0 | | | 0 | | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 76 | | 122 | | | | 0 | 247 | | | 335 | 0 | 780 |
| | | | v/c | 0.22 | | 0.24 | | | | | 0.16 | | | 0.21 | | 0.24 |
| | | | Delay (s) | 18 | | 14 | | | | | 0 | | | 0 | | 3.80 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 6 | | 7 | | | | | 0 | | | 0 | | |
| St Georges / 15th St. | PM | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 35 | 134 | 52 | 43 | 160 | 48 | 17 | 115 | 77 | 78 | 301 | 39 | 1099 |
| | | | v/c | | 0.38 | 0.13 | | 0.46 | 0.11 | | 0.20 | 0.14 | | 0.60 | 0.07 | 0.60 |
| | | | Delay (s) | | 15 | 5 | | 16 | 5 | | 8 | 3 | | 13 | 5 | 11.4 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 8 | 0 | | 10 | 0 | | 5 | 0 | | 18 | 1 | |
| | | | 95th Queue Length** | | 28 | 6 | | 33 | 6 | | 16 | 5 | | 49 | 5 | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 30 | 165 | 52 | 13 | 147 | 22 | 43 | 168 | 47 | 48 | 387 | 61 | 1183 |
| | | | v/c | | 0.42 | 0.13 | | 0.33 | 0.05 | | 0.33 | 0.08 | | 0.62 | 0.11 | 0.62 |
| | | | Delay (s) | | 15 | 5 | | 14 | 7 | | 9 | 3 | | 13 | 5 | 11.4 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 10 | 0 | | 8 | 0 | | 8 | 0 | | 21 | 1 | |
| | | | 95th Queue Length** | | 32 | 6 | | 26 | 4 | | 24 | 4 | | 54 | 6 | |
| St Andrews / 13th St. | PM | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 17 | 354 | 34 | 22 | 205 | 9 | 47 | 152 | 74 | 13 | 52 | 47 | 1026 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.87 | 0.87 | 0.87 | 0.35 | 0.35 | 0.35 | 0.87 |
| | | | Delay (s) | 0 | 1 | 1 | 0 | 1 | 1 | 58 | 58 | 58 | 21 | 21 | 21 | 18.10 |
| | | | LOS | A | A | A | A | A | A | F | F | F | C | C | C | C |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | 0 | 0 | 1 | 1 | 1 | 63 | 63 | 63 | 12 | 12 | 12 | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 8 | 194 | 3 | 26 | 256 | 5 | 17 | 17 | 26 | 9 | 43 | 21 | 625 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.14 | 0.14 | 0.14 | 0.18 | 0.18 | 0.18 | 0.18 |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 14 | 14 | 14 | 15 | 15 | 15 | 3.60 |
| | | | LOS | A | A | A | A | A | A | B | B | B | B | B | B | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | | | | | | | | | | | | |

Appendix C

Intersection Analysis – Combined Traffic

Combined - Intersection Capacity Analysis (2014)

| Intersection | Scenario | Control Type | Measure | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | Overall Intersection | |
|-----------------------------|------------------|--------------|---------------------|-----------|------|------|-----------|------|------|------------|------|------|------------|------|------|----------------------|------|
| Movement | | | | L | T | R | L | T | R | L | T | R | L | T | R | | |
| 13th St. / Chesterfield Ave | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 | |
| | | | Volume | 111 | 533 | 56 | 43 | 259 | 85 | 40 | 303 | 124 | 31 | 247 | 49 | 1881 | |
| | | | v/c | 0.30 | 0.44 | | 0.15 | 0.26 | | | 0.63 | 0.19 | | 0.33 | | 0.63 | |
| | | | Delay (s) | 12 | 11 | | 11 | 7 | | | 18 | 3 | | 11 | | 11.1 | |
| | | | LOS | B | B | | B | A | | | B | A | | B | | B | |
| | | | 50th Queue Length* | 6 | 18 | | 2 | 7 | | | 26 | 0 | | 10 | | | |
| | | | 95th Queue Length** | 17 | 30 | | 8 | 15 | | | 47 | 7 | | 17 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 | |
| | | | Volume | 139 | 262 | 25 | 41 | 273 | 98 | 34 | 201 | 74 | 19 | 213 | 83 | 1462 | |
| | | | v/c | 0.40 | 0.22 | | 0.11 | 0.29 | | | 0.47 | 0.12 | | 0.32 | | 0.47 | |
| | | | Delay (s) | 13 | 8 | | 9 | 7 | | | 15 | 3 | | 9 | | 9.3 | |
| | | | LOS | B | A | | A | A | | | B | A | | A | | A | |
| | | | 50th Queue Length* | 7 | 6 | | 2 | 7 | | | 14 | 0 | | 7 | | | |
| | | | 95th Queue Length** | 21 | 15 | | 7 | 16 | | | 31 | 6 | | 15 | | | |
| Lonsdale Ave / 11th St. | PM | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 | |
| | | | Volume | 0 | 0 | 31 | 0 | 0 | 58 | 15 | 457 | 19 | 37 | 522 | 31 | 1170 | |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.34 | | | 0.43 | | 0.43 | |
| | | | Delay (s) | | | 0 | | 0 | | | 11 | | | 13 | | 11.0 | |
| | | | LOS | | | A | | A | | | B | | | B | | B | |
| | | | 50th Queue Length* | | | 0 | | 0 | | | 20 | | | 27 | | | |
| | | | 95th Queue Length** | | | 0 | | 0 | | | 29 | | | 42 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 | |
| | | | Volume | 0 | 0 | 28 | 19 | 0 | 28 | 9 | 436 | 34 | 35 | 424 | 16 | 1029 | |
| | | | v/c | | | 0.05 | | 0.10 | | | 0.33 | | | 0.34 | | 0.34 | |
| | | | Delay (s) | | | 0 | | 10 | | | 10 | | | 14 | | 11.4 | |
| | | | LOS | | | A | | A | | | B | | | B | | B | |
| | | | 50th Queue Length* | | | 0 | | 2 | | | 19 | | | 21 | | | |
| | | | 95th Queue Length** | | | 0 | | 8 | | | 28 | | | 35 | | | |
| Lonsdale Ave / 13th St. | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 | |
| | | | Volume | 147 | 390 | 135 | 126 | 228 | 33 | 70 | 406 | 154 | 49 | 492 | 74 | 2304 | |
| | | | v/c | 0.39 | 0.57 | | 0.38 | 0.46 | 0.08 | | 0.45 | 0.24 | | 0.52 | | 0.57 | |
| | | | Delay (s) | 16 | 20 | | 17 | 23 | 7 | | 11 | 2 | | 8 | | 13.4 | |
| | | | LOS | B | C | | B | C | A | | B | A | | A | | B | |
| | | | 50th Queue Length* | 12 | 26 | | 10 | 25 | 0 | | 13 | 0 | | 29 | | | |
| | | | 95th Queue Length** | 21 | 40 | | 19 | 43 | 5 | | 18 | 2 | | 22 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 | |
| | | | Volume | 144 | 287 | 56 | 92 | 265 | 95 | 69 | 395 | 167 | 13 | 499 | 162 | 2244 | |
| | | | v/c | 0.42 | 0.38 | | 0.22 | 0.53 | 0.20 | | 0.46 | 0.26 | | 0.54 | | 0.54 | |
| | | | Delay (s) | 17 | 19 | | 13 | 24 | 5 | | 11 | 2 | | 7 | | 12.1 | |
| | | | LOS | B | B | | B | C | A | | B | A | | A | | B | |
| | | | 50th Queue Length* | 11 | 17 | | 7 | 29 | 0 | | 13 | 0 | | 3 | | | |
| | | | 95th Queue Length** | 21 | 27 | | 14 | 50 | 9 | | 19 | 2 | | 19 | | | |
| Lonsdale Ave / 14th St. | PM | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 | |
| | | | Volume | | | | 24 | | 77 | | 610 | 82 | 113 | 563 | | 1469 | |
| | | | v/c | | | | 0.24 | | | | 0.44 | | | 0.61 | | 0.61 | |
| | | | Delay (s) | | | | 8 | | | | 13 | | | 13 | | 12.5 | |
| | | | LOS | | | | A | | | | B | | | B | | B | |
| | | | 50th Queue Length* | | | | 2 | | | | 36 | | | 31 | | | |
| | | | 95th Queue Length** | | | | 13 | | | | 26 | | | 27 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 | |
| | | | Volume | | | | 49 | | 76 | | 615 | 127 | 144 | 625 | | 1636 | |
| | | | v/c | | | | 0.29 | | | | 0.48 | | | 0.76 | | 0.76 | |
| | | | Delay (s) | | | | 10 | | | | 9 | | | 14 | | 11.4 | |
| | | | LOS | | | | B | | | | A | | | B | | B | |
| | | | 50th Queue Length* | | | | 5 | | | | 22 | | | 28 | | | |
| | | | 95th Queue Length** | | | | 17 | | | | 29 | | | 34 | | | |
| Lonsdale Ave / 15th St. | PM | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | |
| | | | Volume | 54 | 150 | 65 | 88 | 166 | 93 | 41 | 583 | 54 | 63 | 679 | 56 | 2092 | |
| | | | v/c | | 0.34 | | | 0.46 | | | 0.53 | | | 0.63 | | 0.63 | |
| | | | Delay (s) | | 18 | | | 20 | | | 8 | | | 14 | | 13.7 | |
| | | | LOS | | B | | | B | | | A | | | B | | B | |
| | | | 50th Queue Length* | | 14 | | | 19 | | | 38 | | | 39 | | | |
| | | | 95th Queue Length** | | 23 | | | 30 | | | 12 | | | 56 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | |
| | | | Volume | 47 | 126 | 66 | 95 | 122 | 105 | 80 | 516 | 74 | 80 | 514 | 145 | 1970 | |
| | | | v/c | | 0.30 | | | 0.45 | | | 0.60 | | | 0.65 | | 0.65 | |
| | | | Delay (s) | | 16 | | | 19 | | | 7 | | | 14 | | 12.8 | |
| | | | LOS | | B | | | B | | | A | | | B | | B | |
| | | | 50th Queue Length* | | 11 | | | 17 | | | 5 | | | 34 | | | |
| | | | 95th Queue Length** | | 20 | | | 28 | | | 14 | | | 52 | | | |
| St Georges / 13th St. | PM | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 | |
| | | | Volume | 62 | 317 | 14 | 35 | 196 | 52 | 100 | 34 | 137 | 145 | 120 | 115 | 1327 | |
| | | | v/c | 0.14 | 0.49 | 0.03 | 0.09 | 0.44 | | | 0.36 | | | 0.46 | | 0.49 | |
| | | | Delay (s) | 10 | 18 | 8 | 9 | 17 | | | 9 | | | 12 | | 13.3 | |
| | | | LOS | A | B | A | A | B | | | A | | | B | | B | |
| | | | 50th Queue Length* | 4 | 25 | 0 | 2 | 22 | | | 6 | | | 12 | | | |
| | | | 95th Queue Length** | 9 | 54 | 3 | 6 | 40 | | | 14 | | | 24 | | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 | |
| | | | Volume | 52 | 210 | 59 | 25 | 245 | 70 | 146 | 400 | 29 | 28 | 267 | 31 | 1562 | |
| | | | v/c | 0.14 | 0.33 | 0.11 | 0.05 | 0.56 | | | 0.64 | | | 0.31 | | 0.64 | |
| | | | Delay (s) | 10 | 16 | 5 | 9 | 19 | | | 19 | | | 13 | | 16.3 | |
| | | | LOS | A | B | A | A | B | | | B | | | B | | B | |
| | | | 50th Queue Length* | 3 | 15 | 0 | 2 | 30 | | | 29 | | | 14 | | | |
| | | | 95th Queue Length** | 8 | 36 | 7 | 5 | 53 | | | 48 | | | 24 | | | |
| St Georges / 14th St. | PM | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 | |
| | | | Volume | 75 | | 157 | | | | | 0 | 139 | | | 351 | 0 | 722 |
| | | | v/c | 0.19 | | 0.31 | | | | | | 0.09 | | | 0.22 | | 0.31 |
| | | | Delay (s) | 15 | | 15 | | | | | 0 | | | 0 | | 4.80 | |
| | | | LOS | C | | B | | | | | A | | | A | | A | |
| | | | 50th Queue Length* | | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 5 | | 10 | | | | | 0 | | | 0 | | | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 | |
| | | | Volume | 79 | | 184 | | | | | 0 | 235 | | | 309 | 0 | 807 |
| | | | v/c | 0.22 | | 0.35 | | | | | | 0.15 | | | 0.20 | | 0.35 |
| | | | Delay (s) | 17 | | 14 | | | | | 0 | | | 0 | | 4.90 | |
| | | | LOS | C | | B | | | | | A | | | A | | A | |
| | | | 50th Queue Length* | | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 6 | | 12 | | | | | 0 | | | 0 | | | |
| St Georges / 15th St. | PM | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 | |
| | | | Volume | 33 | 128 | 48 | 40 | 152 | 45 | 15 | 103 | 69 | 74 | 280 | 37 | 1024 | |
| | | | v/c | | 0.31 | 0.10 | | 0.37 | 0.09 | | 0.15 | 0.11 | | 0.48 | 0.06 | 0.48 | |
| | | | Delay (s) | | 13 | 5 | | 14 | 5 | | 8 | 3 | | 11 | 5 | 10.1 | |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B | |
| | | | 50th Queue Length* | | 7 | 0 | | 9 | 0 | | 4 | 0 | | 16 | 0 | | |
| | | | 95th Queue Length** | | 25 | 6 | | 30 | 5 | | 14 | 5 | | 43 | 4 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 | |
| | | | Volume | 29 | 157 | 48 | 12 | 140 | 21 | 42 | 164 | 46 | 45 | 360 | 58 | 1122 | |
| | | | v/c | | 0.35 | 0.10 | | 0.27 | 0.04 | | 0.29 | 0.07 | | 0.51 | 0.09 | 0.51 | |
| | | | Delay (s) | | 14 | 5 | | 13 | 6 | | 9 | 3 | | 11 | 4 | 10.2 | |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B | |
| | | | 50th Queue Length* | | 9 | 0 | | 7 | 0 | | 8 | 0 | | 18 | 1 | | |
| | | | 95th Queue Length** | | 30 | 6 | | 24 | 4 | | 23 | 4 | | 48 | 6 | | |
| St Andrews / 13th St. | PM | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | |
| | | | Volume | 16 | 327 | 31 | 21 | 198 | 8 | 45 | 144 | 70 | 12 | 49 | 45 | 966 | |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.78 | 0.78 | 0.78 | 0.30 | 0.30 | 0.30 | 0.78 | |
| | | | Delay (s) | 0 | 1 | 1 | 0 | 1 | 1 | 42 | 42 | 42 | 19 | 19 | 19 | 13.70 | |
| | | | LOS | A | A | A | A | A | A | E | E | E | C | C | C | B | |
| | | | 50th Queue Length* | | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | 0 | 0 | 1 | 1 | 1 | 49 | 49 | 49 | 10 | 10 | 10 | | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | |
| | | | Volume | 8 | 176 | 3 | 25 | 257 | 5 | 17 | 16 | 25 | 8 | 41 | 21 | 602 | |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.13 | 0.13 | 0.13 | 0.16 | 0.16 | 0.16 | 0.16 | |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 14 | 14 | 14 | 14 | 14 | 14 | 3.50 | |
| | | | LOS | A | A | A | A | A | A | B | B | B | B | B | B | A | |
| | | | 50th Queue Length* | | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | | | | | | | | | | | | | |

Combined - Intersection Capacity Analysis (2024)

| Intersection | Scenario | Control Type | Measure | Eastbound | | | Westbound | | | Northbound | | | Southbound | | | Overall Intersection |
|-----------------------------|------------------|--------------|---------------------|-----------|------|------|-----------|------|------|------------|------|------|------------|-------|------|----------------------|
| Movement | | | L | T | R | L | T | R | L | T | R | L | T | R | | |
| 13th St. / Chesterfield Ave | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 117 | 558 | 58 | 45 | 271 | 89 | 42 | 318 | 130 | 32 | 260 | 52 | 1972 |
| | | | v/c | 0.32 | 0.46 | | 0.17 | 0.27 | | | 0.66 | 0.20 | | 0.34 | | 0.66 |
| | | | Delay (s) | 13 | 11 | | 11 | 8 | | | 19 | 3 | | 11 | | 11.4 |
| | | | LOS | B | B | | B | A | | | B | A | | B | | B |
| | | | 50th Queue Length* | 7 | 20 | | 3 | 8 | | | 27 | 0 | | 10 | | |
| | | | 95th Queue Length** | 17 | 32 | | 8 | 16 | | | 50 | 7 | | 18 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 2> | 0 | 0 | <1 | 1 | 0 | <2> | 0 | 3 |
| | | | Volume | 146 | 274 | 26 | 43 | 285 | 103 | 36 | 211 | 78 | 20 | 224 | 88 | 1534 |
| | | | v/c | 0.43 | 0.23 | | 0.12 | 0.30 | | | 0.49 | 0.13 | | 0.33 | | 0.49 |
| | | | Delay (s) | 14 | 8 | | 9 | 7 | | | 15 | 3 | | 9 | | 9.5 |
| | | | LOS | B | A | | A | A | | | B | A | | A | | A |
| | | | 50th Queue Length* | 8 | 7 | | 2 | 7 | | | 15 | 0 | | 7 | | |
| | | | 95th Queue Length** | 22 | 15 | | 7 | 16 | | | 33 | 6 | | 15 | | |
| Lonsdale Ave / 11th St. | PM | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 32 | 0 | 0 | 61 | 16 | 479 | 19 | 39 | 548 | 32 | 1226 |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.35 | | | 0.45 | | 0.45 |
| | | | Delay (s) | | | 0 | | 0 | | | 11 | | | 14 | | 11.4 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 0 | | | 21 | | | 30 | | |
| | | | 95th Queue Length** | | | 0 | | 0 | | | 31 | | | 45 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | 0 | 1 | 0 | <1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 1 |
| | | | Volume | 0 | 0 | 29 | 19 | 0 | 30 | 10 | 457 | 36 | 36 | 444 | 17 | 1078 |
| | | | v/c | | | 0.06 | | 0.11 | | | 0.34 | | | 0.36 | | 0.36 |
| | | | Delay (s) | | | 0 | | 9 | | | 10 | | | 14 | | 11.7 |
| | | | LOS | | | A | | A | | | B | | | B | | B |
| | | | 50th Queue Length* | | | 0 | | 2 | | | 20 | | | 23 | | |
| | | | 95th Queue Length** | | | 0 | | 9 | | | 29 | | | 37 | | |
| Lonsdale Ave / 13th St. | PM | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 155 | 408 | 142 | 130 | 237 | 35 | 74 | 427 | 161 | 52 | 518 | 78 | 2417 |
| | | | v/c | 0.41 | 0.59 | | 0.41 | 0.48 | 0.08 | | 0.49 | 0.25 | | 0.56 | | 0.59 |
| | | | Delay (s) | 16 | 21 | | 18 | 23 | 7 | | 11 | 2 | | 9 | | 13.8 |
| | | | LOS | B | C | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 28 | | 10 | 26 | 0 | | 13 | 0 | | 29 | | |
| | | | 95th Queue Length** | 22 | 42 | | 19 | 44 | 6 | | 19 | 3 | | 20 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 2> | 0 | 1 | 1 | 1 | 0 | <2 | 1 | 0 | <2> | 0 | 5 |
| | | | Volume | 152 | 299 | 58 | 96 | 276 | 100 | 73 | 415 | 174 | 14 | 524 | 170 | 2351 |
| | | | v/c | 0.45 | 0.40 | | 0.23 | 0.55 | 0.21 | | 0.50 | 0.27 | | 0.57 | | 0.57 |
| | | | Delay (s) | 18 | 19 | | 13 | 24 | 5 | | 12 | 2 | | 7 | | 12.4 |
| | | | LOS | B | B | | B | C | A | | B | A | | A | | B |
| | | | 50th Queue Length* | 12 | 18 | | 7 | 31 | 0 | | 14 | 0 | | 2 | | |
| | | | 95th Queue Length** | 22 | 28 | | 15 | 52 | 9 | | 20 | 2 | | m15.1 | | |
| Lonsdale Ave / 14th St. | PM | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 25 | | 78 | | 642 | 86 | 117 | 592 | | 1540 |
| | | | v/c | | | | 0.25 | | | | 0.46 | | | 0.65 | | 0.65 |
| | | | Delay (s) | | | | 8 | | | | 12 | | | 13 | | 12.1 |
| | | | LOS | | | | A | | | | B | | | B | | B |
| | | | 50th Queue Length* | | | | 3 | | | | 34 | | | 30 | | |
| | | | 95th Queue Length** | | | | 13 | | | | 27 | | | 26 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | | | | 1> | | 0 | | 2> | 0 | 0 | <2 | | 0 |
| | | | Volume | | | | 51 | | 77 | | 647 | 133 | 149 | 658 | | 1715 |
| | | | v/c | | | | 0.30 | | | | 0.50 | | | 0.81 | | 0.81 |
| | | | Delay (s) | | | | 10 | | | | 9 | | | 16 | | 12.4 |
| | | | LOS | | | | B | | | | A | | | B | | B |
| | | | 50th Queue Length* | | | | 5 | | | | 22 | | | 28 | | |
| | | | 95th Queue Length** | | | | 17 | | | | 31 | | | #42.2 | | |
| Lonsdale Ave / 15th St. | PM | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 56 | 158 | 68 | 92 | 174 | 97 | 43 | 611 | 56 | 66 | 712 | 58 | 2191 |
| | | | v/c | | 0.36 | | | 0.49 | | | 0.56 | | | 0.67 | | 0.67 |
| | | | Delay (s) | | 18 | | | 20 | | | 8 | | | 15 | | 14.1 |
| | | | LOS | | B | | | C | | | A | | | B | | B |
| | | | 50th Queue Length* | | 15 | | | 20 | | | 36 | | | 42 | | |
| | | | 95th Queue Length** | | 25 | | | 32 | | | 16 | | | 61 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 0 |
| | | | Volume | 50 | 132 | 69 | 100 | 128 | 110 | 84 | 541 | 78 | 84 | 538 | 153 | 2067 |
| | | | v/c | | 0.32 | | | 0.47 | | | 0.65 | | | 0.69 | | 0.69 |
| | | | Delay (s) | | 17 | | | 20 | | | 8 | | | 15 | | 13.5 |
| | | | LOS | | B | | | B | | | A | | | B | | B |
| | | | 50th Queue Length* | | 12 | | | 18 | | | 6 | | | 37 | | |
| | | | 95th Queue Length** | | 21 | | | 30 | | | 16 | | | 57 | | |
| St Georges / 13th St. | PM | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 65 | 333 | 15 | 37 | 203 | 54 | 103 | 36 | 144 | 150 | 125 | 120 | 1385 |
| | | | v/c | 0.16 | 0.52 | 0.03 | 0.09 | 0.45 | | | 0.37 | | | 0.48 | | 0.52 |
| | | | Delay (s) | 10 | 18 | 8 | 9 | 17 | | | 9 | | | 12 | | 13.6 |
| | | | LOS | A | B | A | A | B | | | A | | | B | | B |
| | | | 50th Queue Length* | 4 | 26 | 0 | 2 | 23 | | | 6 | | | 13 | | |
| | | | 95th Queue Length** | 10 | 57 | 3 | 6 | 41 | | | 15 | | | 26 | | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 1 | 1 | 1 | 1 | 1> | 0 | 0 | <2> | 0 | 0 | <2> | 0 | 4 |
| | | | Volume | 54 | 221 | 62 | 26 | 254 | 74 | 152 | 420 | 30 | 26 | 279 | 31 | 1629 |
| | | | v/c | 0.15 | 0.35 | 0.11 | 0.06 | 0.59 | | | 0.67 | | | 0.32 | | 0.67 |
| | | | Delay (s) | 10 | 16 | 5 | 9 | 20 | | | 19 | | | 14 | | 16.7 |
| | | | LOS | A | B | A | A | B | | | B | | | B | | B |
| | | | 50th Queue Length* | 3 | 16 | 0 | 2 | 31 | | | 31 | | | 14 | | |
| | | | 95th Queue Length** | 9 | 38 | 7 | 5 | 55 | | | 51 | | | 25 | | |
| St Georges / 14th St. | PM | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 78 | | 161 | | | | 0 | 146 | | | 368 | 0 | 753 |
| | | | v/c | 0.20 | | 0.33 | | | | | 0.09 | | | 0.24 | | 0.33 |
| | | | Delay (s) | 16 | | 15 | | | | | 0 | | | 0 | | 4.80 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 15 | | | | | | | 0 | | | 0 | | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 1 | | 1 | | | | 0 | 1 | | | 1 | 0 | 4 |
| | | | Volume | 82 | | 190 | | | | 0 | 247 | | | 323 | 0 | 842 |
| | | | v/c | 0.23 | | 0.36 | | | | | 0.16 | | | 0.21 | | 0.36 |
| | | | Delay (s) | 17 | | 15 | | | | | 0 | | | 0 | | 5.10 |
| | | | LOS | C | | B | | | | | A | | | A | | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 7 | | 13 | | | | | 0 | | | 0 | | |
| St Georges / 15th St. | PM | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 35 | 134 | 50 | 42 | 160 | 48 | 16 | 108 | 72 | 78 | 294 | 39 | 1076 |
| | | | v/c | | 0.38 | 0.12 | | 0.46 | 0.11 | | 0.19 | 0.13 | | 0.59 | 0.07 | 0.59 |
| | | | Delay (s) | | 14 | 5 | | 16 | 5 | | 8 | 3 | | 13 | 5 | 11.4 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 8 | 0 | | 10 | 0 | | 5 | 0 | | 17 | 1 | |
| | | | 95th Queue Length** | | 28 | 6 | | 33 | 6 | | 15 | 5 | | 47 | 5 | |
| | Mid-Day Saturday | Signalized | Lane Configurations | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 0 | <1 | 1 | 4 |
| | | | Volume | 30 | 165 | 50 | 13 | 147 | 22 | 44 | 172 | 48 | 48 | 378 | 61 | 1178 |
| | | | v/c | | 0.42 | 0.12 | | 0.33 | 0.05 | | 0.34 | 0.08 | | 0.61 | 0.11 | 0.61 |
| | | | Delay (s) | | 15 | 5 | | 14 | 7 | | 9 | 3 | | 13 | 5 | 11.3 |
| | | | LOS | | B | A | | B | A | | A | A | | B | A | B |
| | | | 50th Queue Length* | | 10 | 0 | | 8 | 0 | | 9 | 0 | | 20 | 1 | |
| | | | 95th Queue Length** | | 32 | 6 | | 26 | 4 | | 24 | 4 | | 52 | 6 | |
| St Andrews / 13th St. | PM | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 16 | 341 | 33 | 22 | 206 | 9 | 47 | 152 | 74 | 13 | 52 | 47 | 1012 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.85 | 0.85 | 0.85 | 0.34 | 0.34 | 0.34 | 0.85 |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 54 | 54 | 54 | 20 | 20 | 20 | 17.20 |
| | | | LOS | A | A | A | A | A | A | A | F | F | F | C | C | C |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | 95th Queue Length** | 0 | 0 | 0 | 1 | 1 | 1 | 60 | 60 | 60 | 11 | 11 | 11 | |
| | Mid-Day Saturday | Unsignalized | Lane Configurations | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 | <1> | 0 | 0 |
| | | | Volume | 8 | 182 | 3 | 26 | 287 | 5 | 18 | 17 | 26 | 9 | 43 | 22 | 626 |
| | | | v/c | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.14 | 0.14 | 0.14 | 0.18 | 0.18 | 0.18 | 0.18 |
| | | | Delay (s) | 0 | 0 | 0 | 0 | 1 | 1 | 14 | 14 | 14 | 15 | 15 | 15 | 3.60 |
| | | | LOS | A | A | A | A | A | A | B | B | B | B | B | B | A |
| | | | 50th Queue Length* | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

Appendix D

Turn Path Analysis: 14th Street/N-S Lane Access

Appendix E

Pedestrian LoS Analysis

| Approach | WB | NB | SB |
|----------------------------------|----------|----------|----------|
| Crosswalk Length (m) | 7.42 | 14.80 | 14.80 |
| Crosswalk Width (m) | 5.00 | 2.99 | 2.99 |
| Total Number of Lanes Crossed | 2 | 4 | 4 |
| Number of Right-Turn Islands | 0 | 0 | 0 |
| Type of Control | Actuated | Act+Rest | Act+Rest |
| Corresponding Signal Phase | 8 | 2 | 6 |
| Effective Walk Time (s) | 0.0 | 41.0 | 28.8 |
| Right Corner Size A (m) | 5.00 | 5.00 | 5.00 |
| Right Corner Size B (m) | 5.00 | 5.00 | 5.00 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 25.00 | 25.00 | 25.00 |
| Ped. Left-Right Flow Rate (p/h) | 46 | 77 | 115 |
| Ped. Right-Left Flow Rate (p/h) | 46 | 77 | 115 |
| Ped. R. Sidewalk Flow Rate (p/h) | 200 | 200 | 200 |
| Veh. Perm. L. Flow in Walk (v/h) | 95 | 16 | 0 |
| Veh. Perm. R. Flow in Walk (v/h) | 85 | 0 | 40 |
| Veh. RTOR Flow in Walk (v/h) | 10 | 20 | 0 |
| 85th percentile speed (km/h) | 30 | 50 | 50 |
| Right Corner Area per Ped (sq.m) | 42.2 | 49.7 | 37.9 |
| Right Corner Quality of Service | A | A | A |
| Ped. Circulation Area (sq.m) | 0.0 | 31.8 | 14.4 |
| Crosswalk Circulation Code | F | A | A |
| Pedestrian Delay (s/p) | 42.5 | 11.4 | 18.6 |
| Pedestrian Compliance Code | Poor | Fair | Fair |
| Pedestrian Crosswalk Score | 1.95 | 2.51 | 2.49 |
| Pedestrian Crosswalk LOS | A | B | B |

| Approach | EB | WB | NB | SB |
|----------------------------------|-----------|-----------|-----------|-----------|
| Crosswalk Length (m) | 7.50 | 7.41 | 8.14 | 8.23 |
| Crosswalk Width (m) | 1.19 | 1.19 | 1.19 | 1.19 |
| Total Number of Lanes Crossed | 2 | 2 | 2 | 2 |
| Number of Right-Turn Islands | 0 | 0 | 0 | 0 |
| Type of Control | No signal | No signal | No signal | No signal |
| Corresponding Signal Phase | 6 | 2 | 4 | 4 |
| Effective Walk Time (s) | 16.0 | 16.0 | 16.0 | 16.0 |
| Right Corner Size A (m) | 2.74 | 2.74 | 2.74 | 2.74 |
| Right Corner Size B (m) | 2.74 | 2.74 | 2.74 | 2.74 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 7.51 | 7.51 | 7.51 | 7.51 |
| Ped. Left-Right Flow Rate (p/h) | 18 | 16 | 45 | 55 |
| Ped. Right-Left Flow Rate (p/h) | 18 | 16 | 45 | 55 |
| Ped. R. Sidewalk Flow Rate (p/h) | 200 | 200 | 200 | 200 |
| Veh. Perm. L. Flow in Walk (v/h) | 25 | 16 | 0 | 34 |
| Veh. Perm. R. Flow in Walk (v/h) | 19 | 19 | 38 | 0 |
| Veh. RTOR Flow in Walk (v/h) | 38 | 0 | 19 | 19 |
| 85th percentile speed (km/h) | 30 | 30 | 31 | 31 |
| Right Corner Area per Ped (sq.m) | 20.6 | 19.6 | 20.8 | 19.4 |
| Right Corner Quality of Service | A | A | A | A |
| Ped. Circulation Area (sq.m) | 36.2 | 40.9 | 15.0 | 12.3 |
| Crosswalk Circulation Code | A | A | A | A |
| Pedestrian Delay (s/p) | 7.2 | 7.2 | 7.2 | 7.2 |
| Pedestrian Compliance Code | Good | Good | Good | Good |
| Pedestrian Crosswalk Score | 1.81 | 1.71 | 1.71 | 1.76 |
| Pedestrian Crosswalk LOS | A | A | A | A |

| Approach | EB | NB | SB |
|----------------------------------|-----------|----------|----------|
| Crosswalk Length (m) | 8.29 | 11.10 | 7.40 |
| Crosswalk Width (m) | 1.19 | 2.50 | 2.50 |
| Total Number of Lanes Crossed | 2 | 3 | 2 |
| Number of Right-Turn Islands | 0 | 0 | 0 |
| Type of Control | No signal | Actuated | Actuated |
| Corresponding Signal Phase | 6 | 4 | 2 |
| Effective Walk Time (s) | 33.0 | 9.0 | 9.0 |
| Right Corner Size A (m) | 2.74 | 2.74 | 2.74 |
| Right Corner Size B (m) | 2.74 | 2.74 | 2.74 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 7.51 | 7.51 | 7.51 |
| Ped. Left-Right Flow Rate (p/h) | 35 | 19 | 11 |
| Ped. Right-Left Flow Rate (p/h) | 35 | 19 | 11 |
| Ped. R. Sidewalk Flow Rate (p/h) | 100 | 100 | 100 |
| Veh. Perm. L. Flow in Walk (v/h) | 0 | 0 | 91 |
| Veh. Perm. R. Flow in Walk (v/h) | 0 | 90 | 0 |
| Veh. RTOR Flow in Walk (v/h) | 90 | 0 | 0 |
| 85th percentile speed (km/h) | 30 | 50 | 50 |
| Right Corner Area per Ped (sq.m) | 32.1 | 41.8 | 34.9 |
| Right Corner Quality of Service | A | A | A |
| Ped. Circulation Area (sq.m) | 27.7 | 26.0 | 35.2 |
| Crosswalk Circulation Code | A | A | A |
| Pedestrian Delay (s/p) | 6.1 | 21.7 | 21.7 |
| Pedestrian Compliance Code | Good | Fair | Fair |
| Pedestrian Crosswalk Score | 1.83 | 2.14 | 2.16 |
| Pedestrian Crosswalk LOS | A | B | B |

| Approach | EB | WB | NB | SB |
|----------------------------------|-----------|-----------|-----------|-----------|
| Crosswalk Length (m) | 7.50 | 7.41 | 8.14 | 8.23 |
| Crosswalk Width (m) | 1.19 | 1.19 | 1.19 | 1.19 |
| Total Number of Lanes Crossed | 2 | 2 | 2 | 2 |
| Number of Right-Turn Islands | 0 | 0 | 0 | 0 |
| Type of Control | No signal | No signal | No signal | No signal |
| Corresponding Signal Phase | 6 | 2 | 4 | 4 |
| Effective Walk Time (s) | 16.0 | 16.0 | 16.0 | 16.0 |
| Right Corner Size A (m) | 2.74 | 2.74 | 2.74 | 2.74 |
| Right Corner Size B (m) | 2.74 | 2.74 | 2.74 | 2.74 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 7.51 | 7.51 | 7.51 | 7.51 |
| Ped. Left-Right Flow Rate (p/h) | 20 | 17 | 90 | 55 |
| Ped. Right-Left Flow Rate (p/h) | 20 | 17 | 90 | 55 |
| Ped. R. Sidewalk Flow Rate (p/h) | 200 | 200 | 200 | 200 |
| Veh. Perm. L. Flow in Walk (v/h) | 71 | 16 | 0 | 34 |
| Veh. Perm. R. Flow in Walk (v/h) | 19 | 106 | 69 | 0 |
| Veh. RTOR Flow in Walk (v/h) | 69 | 0 | 106 | 19 |
| 85th percentile speed (km/h) | 30 | 30 | 31 | 31 |
| Right Corner Area per Ped (sq.m) | 15.9 | 19.5 | 16.1 | 19.1 |
| Right Corner Quality of Service | A | A | A | A |
| Ped. Circulation Area (sq.m) | 30.8 | 34.5 | 7.2 | 12.3 |
| Crosswalk Circulation Code | A | A | A | A |
| Pedestrian Delay (s/p) | 7.2 | 7.2 | 7.2 | 7.2 |
| Pedestrian Compliance Code | Good | Good | Good | Good |
| Pedestrian Crosswalk Score | 1.94 | 1.74 | 1.89 | 1.75 |
| Pedestrian Crosswalk LOS | A | A | A | A |

| Approach | WB | NB | SB |
|----------------------------------|----------|----------|----------|
| Crosswalk Length (m) | 7.42 | 14.80 | 14.80 |
| Crosswalk Width (m) | 5.00 | 2.99 | 2.99 |
| Total Number of Lanes Crossed | 2 | 4 | 4 |
| Number of Right-Turn Islands | 0 | 0 | 0 |
| Type of Control | Actuated | Act+Rest | Act+Rest |
| Corresponding Signal Phase | 8 | 2 | 6 |
| Effective Walk Time (s) | 0.0 | 41.0 | 28.8 |
| Right Corner Size A (m) | 5.00 | 5.00 | 5.00 |
| Right Corner Size B (m) | 5.00 | 5.00 | 5.00 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 25.00 | 25.00 | 25.00 |
| Ped. Left-Right Flow Rate (p/h) | 95 | 85 | 120 |
| Ped. Right-Left Flow Rate (p/h) | 95 | 85 | 120 |
| Ped. R. Sidewalk Flow Rate (p/h) | 200 | 200 | 200 |
| Veh. Perm. L. Flow in Walk (v/h) | 117 | 25 | 0 |
| Veh. Perm. R. Flow in Walk (v/h) | 86 | 0 | 78 |
| Veh. RTOR Flow in Walk (v/h) | 10 | 20 | 0 |
| 85th percentile speed (km/h) | 30 | 50 | 50 |
| Right Corner Area per Ped (sq.m) | 34.6 | 39.1 | 36.3 |
| Right Corner Quality of Service | A | A | A |
| Ped. Circulation Area (sq.m) | 0.0 | 28.6 | 13.5 |
| Crosswalk Circulation Code | F | A | A |
| Pedestrian Delay (s/p) | 42.5 | 11.4 | 18.6 |
| Pedestrian Compliance Code | Poor | Fair | Fair |
| Pedestrian Crosswalk Score | 2.01 | 2.52 | 2.50 |
| Pedestrian Crosswalk LOS | B | B | B |

| Approach | EB | NB | SB |
|----------------------------------|-----------------------------|-------|------|
| Crosswalk Length (m) | 8.29 | 11.10 | 7.40 |
| Crosswalk Width (m) | 1.19 | 2.50 | 2.50 |
| Total Number of Lanes Crossed | 2 | 3 | 2 |
| Number of Right-Turn Islands | 0 | 0 | 0 |
| Type of Control | No signal Actuated Actuated | | |
| Corresponding Signal Phase | 6 | 4 | 2 |
| Effective Walk Time (s) | 33.0 | 9.0 | 9.0 |
| Right Corner Size A (m) | 2.74 | 2.74 | 2.74 |
| Right Corner Size B (m) | 2.74 | 2.74 | 2.74 |
| Right Corner Curb Radius (m) | 0.00 | 0.00 | 0.00 |
| Right Corner Total Area (sq.m) | 7.51 | 7.51 | 7.51 |
| Ped. Left-Right Flow Rate (p/h) | 60 | 22 | 14 |
| Ped. Right-Left Flow Rate (p/h) | 60 | 22 | 14 |
| Ped. R. Sidewalk Flow Rate (p/h) | 100 | 100 | 100 |
| Veh. Perm. L. Flow in Walk (v/h) | 0 | 0 | 78 |
| Veh. Perm. R. Flow in Walk (v/h) | 0 | 161 | 0 |
| Veh. RTOR Flow in Walk (v/h) | 161 | 0 | 0 |
| 85th percentile speed (km/h) | 30 | 50 | 50 |
| Right Corner Area per Ped (sq.m) | 25.2 | 38.8 | 26.9 |
| Right Corner Quality of Service | A | A | A |
| Ped. Circulation Area (sq.m) | 16.1 | 18.5 | 29.2 |
| Crosswalk Circulation Code | A | A | A |
| Pedestrian Delay (s/p) | 6.1 | 21.7 | 21.7 |
| Pedestrian Compliance Code | Good | Fair | Fair |
| Pedestrian Crosswalk Score | 1.95 | 2.17 | 2.13 |
| Pedestrian Crosswalk LOS | A | B | B |