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2/27/2004

Ms. Melanie Marchand, MAIBC
City of Vancouver
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515 West 10th Avenue, Suite 300
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*ISO 9001 Registered
Quality Assured*

Dear Ms. Marchand:

RE: 1 Kingsway Project - Traffic and Parking Assessment

In response to the City of Vancouver's direction, as articulated in the Terms of Reference of the Traffic and Parking Consulting Services – 1 Kingsway Request for Proposals, Hamilton Associates has prepared the following report on traffic and parking requirements for the 1 Kingsway Project. This final report reflects the latest architectural program as well as the various parking surveys conducted.

This report includes:

- Relevant background information;
- Consultant work program description;
- Study area transportation environment;
- Trip generation, modal composition, and distribution;
- 1 Kingsway access accommodation strategies;
- Assessment of future transportation changes on the 1 Kingsway Project;
- Parking and loading requirements; and
- Conclusions and recommendations.

1.0 BACKGROUND

The development of a new community centre at 1 Kingsway in the Mount Pleasant Community continues to fulfill Vancouver's CityPlan vision for development of multiple civic services neighbourhood "centres". The 1 Kingsway Project, the location of which is illustrated in FIGURE 1.1, will feature, a library, a child care centre, rental housing, and underground parking. FIGURE 1.1 also identifies the boundaries of the study area for the traffic and parking assessment.



FIGURE 1.1 1 KINGSWAY PROJECT LOCATION

This signature development will demonstrate the principles of sustainable development including transportation site servicing characteristics that foster safe and efficient access for pedestrians, cyclists, transit patrons, as well as service vehicles and automobile based travelers. The proximity of 1 Kingsway to major transit and cycling routes coupled with a high percentage of pedestrian travel provides a significant opportunity for influencing the use of pedestrian, cycling and transit modes for site generated travel, thereby supporting sustainability objectives.

2.0 CONSULTANT WORK PROGRAM

Hamilton Associates executed a work program that was organized into the following four activities and tasks:

- Activity 1, Project Initiation, included attendance at the project initiation meeting, assembly of assessment data, and development of micro-simulation models;
- Activity 2, Transportation Assessment, included identification of existing transportation performance and capabilities, identification of future transportation plans that could potentially affect development access, and identification of access opportunities and constraints.
- Activity 3, Identification of Development Related Transportation Needs; included identification of development trip generation and distribution by mode, identification of modal access integration strategies, assessment of future transportation network effects, identification of development parking and loading requirements, and a client briefing.
- Activity 4, Project Completion, included attendance at a public consultation meeting, finalization of 1 Kingsway parking and access strategies and completion of a final report.

3.0 STUDY AREA TRANSPORTATION ENVIRONMENT

The Study Area transportation infrastructure consists of sidewalks, roadways, traffic controls, and transit stops. The roadway Study Area network, illustrated in FIGURE 3.1, is configured in the original street grid of one of Vancouver's earliest precincts. Grid based roadway networks do not conform with hierarchical roadway configurations preferred in current planning. Because the Study Area is located between major commuter origins and destinations, residential areas located to the east of Main Street were traffic calmed to prevent excessive exposure to through traffic. The highest utilization of area roadways by all modes occurs during the weekday afternoon peak period (4:30 – 5:30 PM). FIGURE 3.1 identifies the PM Peak hour traffic on all Study Area roadways. As can be seen, the traffic calmed areas feature vehicle exposures that are appropriate for residential areas. Roadways to the west of Main Street have hourly traffic exposures more typical of collector roadways. This is in part due to westbound left turn restrictions along Broadway east of Main Street.



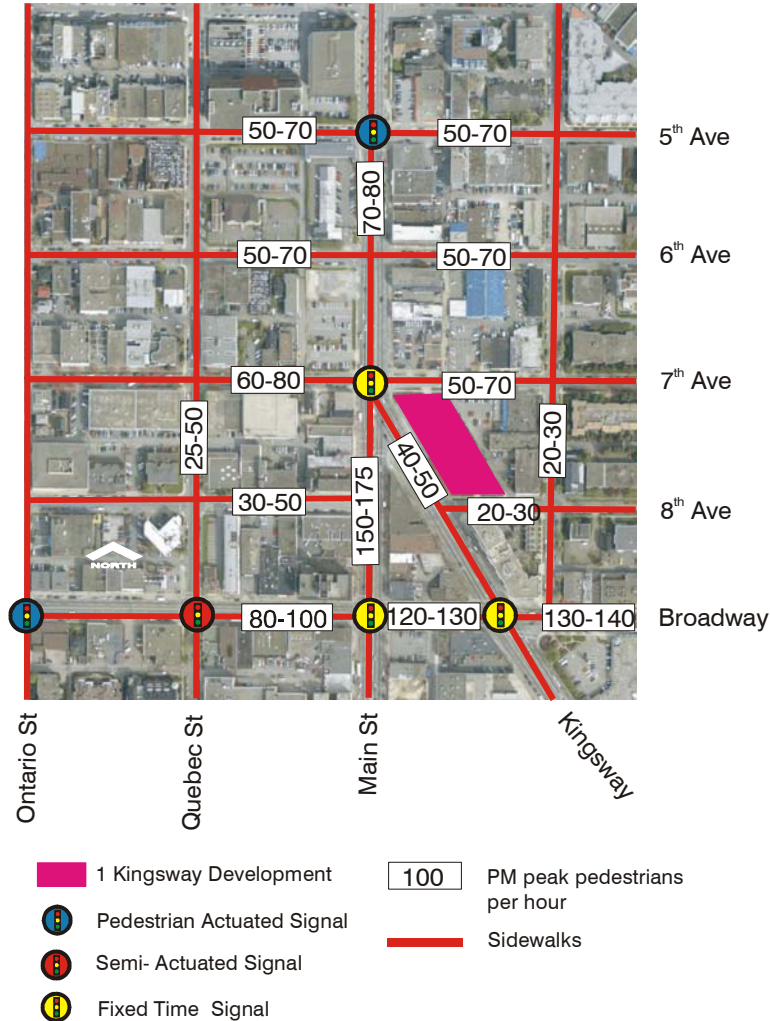
Source: City of Vancouver Intersection Count Summaries

FIGURE 3.1 STUDY AREA ROADWAY NETWORK

3.1 1 Kingsway Accessibility

Pedestrians

As shown in FIGURES 3.2 pedestrians access the site through sidewalk infrastructure adjacent to all roadways shown . East-west crossings of Main Street are facilitated by traffic signals at 5th Avenue and 7th Avenue. Pedestrians leave 1 Kingsway using the same routing used for accessing the site.



Source: City of Vancouver Intersection Count Summaries and Hamilton Associates Observations during June and July 2003

FIGURE 3.2 STUDY AREA PEDESTRIAN NETWORK

Given the configuration of the intersection of Main Street/Kingsway and 7th Avenue traffic flows through this intersection continually. In order to facilitate east-west signalized pedestrian crossings at this location, cross walks have been moved south of the intersection so that pedestrians and cyclists cross Main Street and Kingsway as separate crossings. Pedestrians and cyclists are exposed to significant conflicting traffic. At the Main Street crossing, northbound vehicular right turns to both 7th Avenue and Kingsway are permitted adding additional complexity which affect pedestrian safety and comfort.

Northbound pedestrians access 1 Kingsway via Quebec Street, Main Street, Scotia Street, 7th Avenue, 8th Avenue, and Broadway. Northbound pedestrians using Kingsway access the site directly. Northbound pedestrians using the west side of Kingsway must cross Kingsway at either Broadway, 8th Avenue or 7th Avenue.

Northbound pedestrians using Main Street and Quebec Street to access 1 Kingsway can utilize Broadway and 7th Avenue to gain access to Kingsway and then utilize the same routings as northbound Kingsway pedestrians. Northbound pedestrians using Scotia Street access the site via 8th Avenue.

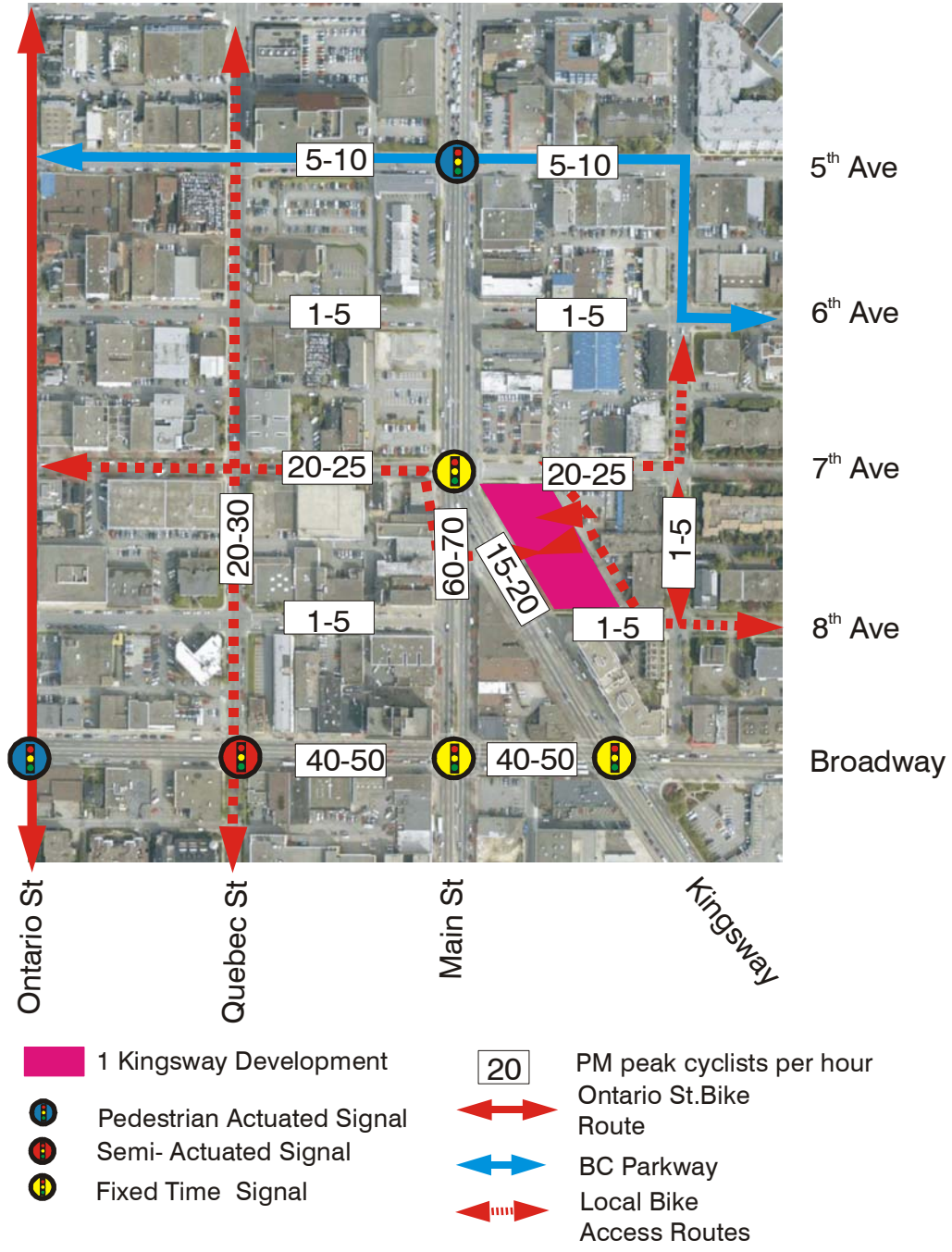
Southbound pedestrians leaving 1 Kingsway utilize the same routings as northbound pedestrians accessing the site.

Pedestrians from the west access 1 Kingsway via Broadway and 7th Avenue. Signalized cross walks facilitate crossings of Main Street and Kingsway. Westbound pedestrians leaving 1 Kingsway utilize the same routings as eastbound pedestrians.

Pedestrian access from the east is provided by sidewalks along 7th Avenue, 8th Avenue Broadway, and Kingsway. Westbound pedestrians accessing 1 Kingsway and eastbound pedestrians leaving the site can do so with minimal vehicular conflicts along Scotia Street.

Cyclists

FIGURE 3.3 describes Study Area cycling facilities and 1 Kingsway access routes. Southbound cyclists can access 1 Kingsway via the Ontario Street Bikeway, the BC Parkway, Quebec Street, Main Street, and Kingsway. Main Street/Kingsway cyclists access the site via either 7th Avenue or 8th Avenue. Cyclists using Ontario or Quebec Streets would utilize 7th Avenue as the prime access route. Cyclists using Scotia Street could use either 7th or 8th Avenues to access 1 Kingsway.



Source: City of Vancouver Intersection Count Summaries and Hamilton Associates Observations during June and July 2003

FIGURE 3.3 CYCLING NETWORK

Northbound cyclists utilize Quebec Street, Ontario Street, Main Street, Kingsway, Scotia Street Broadway, 8th Avenue and 7th Avenue. Northbound cyclists using Kingsway access 1 Kingsway via a right turn at either 8th Avenue or 7th Avenue. Northbound cyclist using Main Street access the site via a right turn at Main Street and 7th Avenue. Northbound cyclists using Ontario Street and Quebec Street utilize 7th Avenue to access 1 Kingsway. Northbound cyclists using Scotia Street access the site via a northbound to westbound right turn at 8th Avenue.

Eastbound cyclists accessing 1 Kingsway and westbound cyclists leaving the site would utilize 7th Avenue. Crossings of Main Street and Kingsway are facilitated by signalized crosswalks.

Cycling access from the east is provided by 7th Avenue and 8th Avenue and Broadway. Westbound pedestrians accessing 1 Kingsway and eastbound pedestrians leaving the site operate on low volume roadways.

Transit

The site is very well served by transit routes. Transit passengers from the south access the site via routes 3 and 19 as illustrated FIGURE 3.4.

Route 3 stops are located along Main Street between Broadway and 7th Avenue. Passengers accessing 1 Kingsway would have to cross both Main Street and Kingsway while departing passengers would have to cross Kingsway only. Route 19 stops are located on Kingsway near the site. Arriving southbound route 3 passengers would have to cross Kingsway at either 8th or 7th Avenue to access 1 Kingsway. Departing northbound route 3 passengers have to cross 8th Avenue to access the transit stop located between Broadway and 8th Avenue.

Transit access from the south is also provided by Routes 3 and 19. Route 3 which operates along Kingsway stops between Broadway and 7th Avenue. Northbound route 3 passengers accessing 1 Kingsway would have to cross Kingsway at 7th Avenue while departing southbound route 3 passengers would have to cross Kingsway and Main Street. Route 19 stops are located on Kingsway near the site. Arriving northbound route 19 passengers would only have to cross 8th Avenue to access 1 Kingsway while departing southbound route 19 passengers would have to cross Kingsway at either 8th or 7th Avenue.

Transit access from the west is provided by routes 9 and 99. Route 9 which operates along Broadway provides Vancouver based transit access to the Study Area while the #99 B-Line, which also operates along Broadway, provides express bus connections between UBC and the Commercial Street SkyTrain Station.

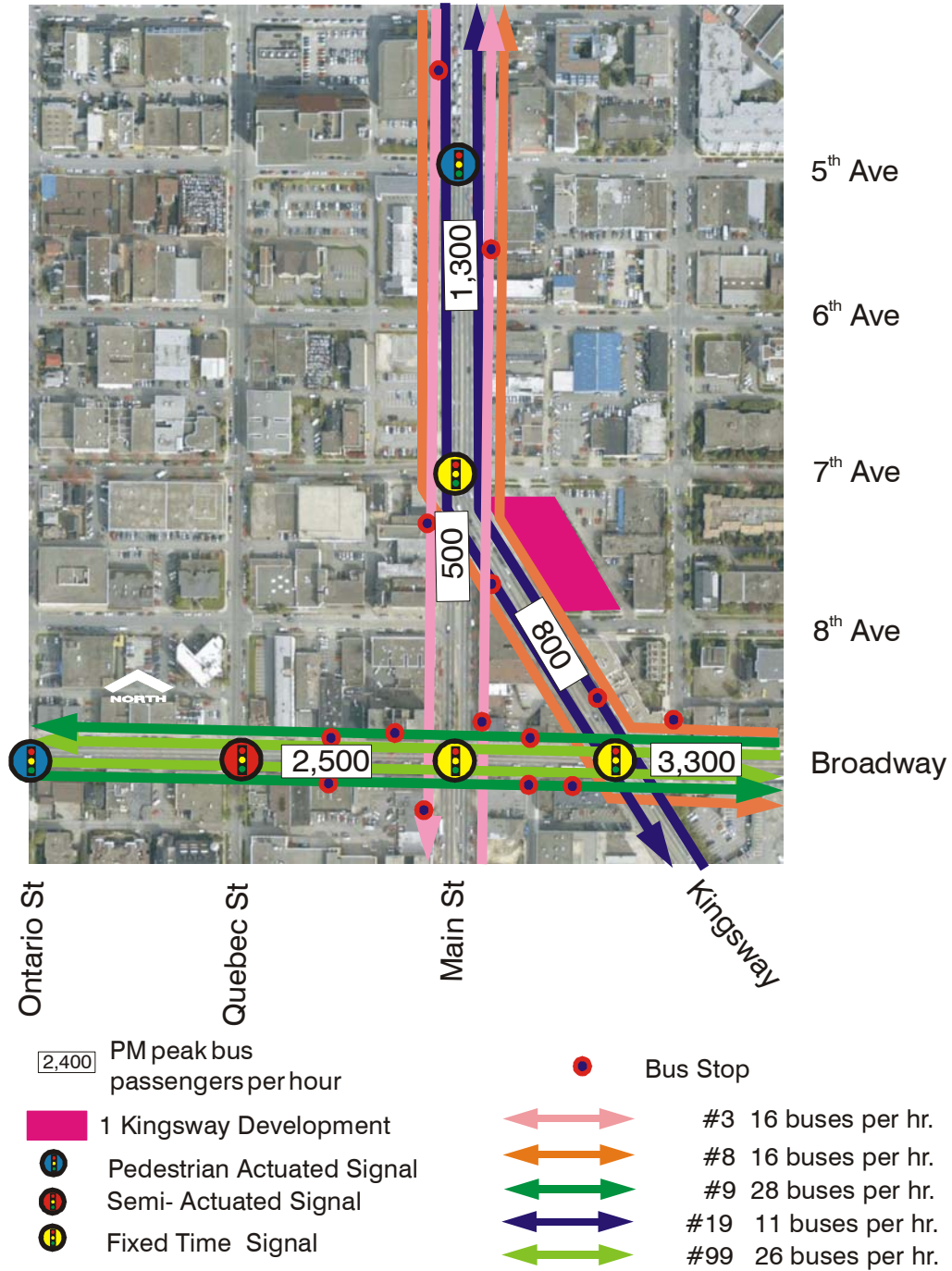


FIGURE 3.4 TRANSIT NETWORK

Eastbound transit passengers access 1 Kingsway from stops located on the south side of Broadway between Main Street and Kingsway requiring a crossing of Broadway and Kingsway. These crossings are facilitated by exclusive pedestrian phases at the signalized intersections of Kingsway and Broadway and Kingsway and Main Street.

Westbound transit passengers access 1 Kingsway via transit routes 9 and 99 at bus stops located on the south side of Broadway between Kingsway and Main Street. Eastbound transit passengers leaving 1 Kingsway access routes 9 and 99 at stops located on the south side of Broadway between Main Street and Kingsway. These crossings are facilitated by exclusive pedestrian phases at the signalized intersections of Kingsway and Broadway and Kingsway and Main Street

General Purpose Traffic

General purpose vehicular (GPV) access to the site from the north can only be made via a southbound left turn at the unsignalized intersection of Kingsway and 8th Avenue. General purpose vehicles leave the site via a westbound to northbound right turn at the intersection of Kingsway and 7th Avenue.

GPV access to the site from the south can be made via northbound right turns from Main Street at 7th or 8th Avenue as well as northbound right turns at either Kingsway and 8th Avenue or Kingsway and 7th Avenue. Southbound GPV's can only leave the site via westbound to southbound left turn at the intersection of Kingsway and 8th Avenue.

GPV access to the site from the west cannot be made via Broadway because of left turn prohibitions at the intersections of Broadway and Main Street and Broadway and Kingsway. Therefore westbound access is can only be made via an eastbound right turn from 7th Avenue to Kingsway and a subsequent southbound left turn at Kingsway and 8th Avenue. Westbound GPV's leaving the site would do so via a westbound to southbound left turn at Kingsway and 8th Avenue and a subsequent southbound to westbound right turn at Kingsway and Broadway.

GPV access to the site from the east can be made via a westbound right turn at Broadway and Kingsway and subsequent northbound right turns at either 7th Avenue or 7th Avenue. Departing eastbound vehicles make a westbound left turn at Kingsway and 8th Avenue and a subsequent southbound left turn at Kingsway and Broadway.

4.0 TRIP GENERATION, TRIP DISTRIBUTION AND MODAL COMPOSITION

In order to assess the transportation effects of the 1 Kingsway development estimates of: travel generated by the site; modal composition of generated trips; and the distribution of these trips had to be identified.

4.1 Site Trip Generation

The 1 Kingsway Project will house a community centre that includes: offices; a gymnasium; meeting rooms; a library; a restaurant; and day care centre, as well as residential rental accommodation. The morning and afternoon peak travel generated by these uses was estimated from the 6th Edition of Institute of Transportation Engineers (ITE) Trip Generation Manual. TABLE 4.1 provides a summary of the estimated vehicle site trip generation.

TABLE 4.1 SITE TRIP GENERATION

| MORNING TRIPS – AM PEAK HOUR | | | | | | | | |
|---------------------------------------|--------------|------------|-------------|--------------|-------------|--------------|--------------|-------------|
| USES | UNITS | NO. | RATE | ENTER | EXIT | TOTAL | ENTER | EXIT |
| Community Centre | 1000 sq. ft | 30.7 | 1.32 | 53% | 47% | 41 | 21 | 19 |
| Library | 1000 sq. ft | 12 | 1.06 | 72% | 28% | 13 | 9 | 4 |
| Apartments | units | 85 | 0.29 | 29% | 71% | 25 | 7 | 18 |
| Day Care | clients | 49 | 0.84 | 53% | 47% | 41 | 22 | 19 |
| TOTAL | | | | | | 120 | 60 | 60 |
| AFTERNOON TRIPS – PM PEAK HOUR | | | | | | | | |
| USES | UNITS | NO. | RATE | ENTER | EXIT | TOTAL | ENTER | EXIT |
| Community Centre | 1000 sq. ft | 30.7 | 2.26 | 37% | 63% | 69 | 26 | 44 |
| Library | 1000 sq. ft | 12 | 7.09 | 37% | 63% | 85 | 31 | 54 |
| Apartments | units | 85 | 0.400 | 58% | 42% | 34 | 20 | 14 |
| Day Care | clients | 49 | 1.295 | 47% | 53% | 41 | 19 | 22 |
| TOTAL | | | | | | 230 | 96 | 133 |

4.2 TRIP DISTRIBUTION

In order to ascertain how the trips forecast to be generated would be distributed the regional emme/2 travel forecast model was utilized. The regional emme/2 model contains travel distributions between all areas of the region for work, school and other trip purposes. In order to identify where trips generated by 1 Kingsway originate and are destined to, the emme2/model was customized to provide trip interchange information between 1 Kingsway and the immediate neighborhood (an area that is within a 1.5 km radius of 1 Kingsway), the Mount Pleasant Neighborhood, downtown Vancouver, the entire City of Vancouver, and the entire region. FIGURE 4.1 describes these areas.

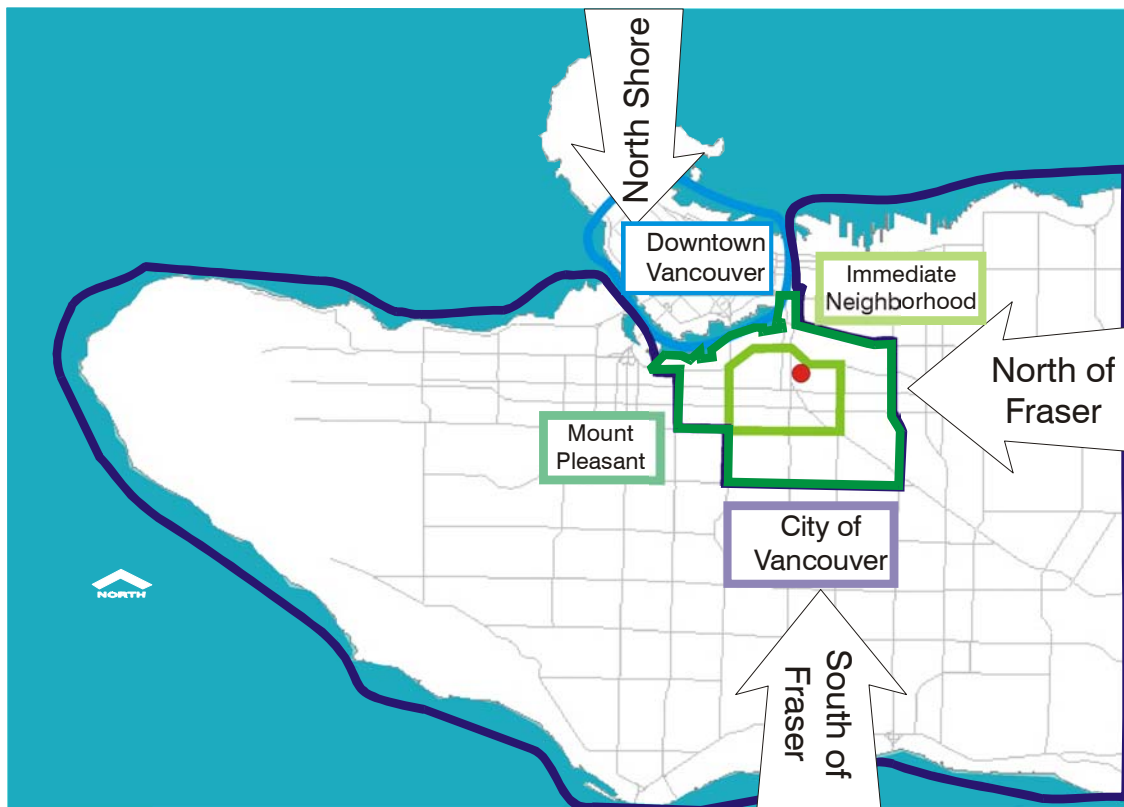


FIGURE 4.1 EMME/2 TRIP INTERCHANGE AREAS

The majority of Community Centre related travel would be within the Mount Pleasant Community. Whereas a significant component of travel generated by the residential land uses could occur outside the Mount Pleasant Community. TABLE 4.2 describes the origin and destination composition of the study area AM peak hour trips.

TABLE 4.2 AM PEAK HOUR TRIP ORIGIN AND DESTINATIONS

| From Study Area to: | Total trips | % of total | To Study Area from: | Total trips | % of total |
|----------------------------|--------------------|-------------------|----------------------------|--------------------|-------------------|
| Study Area | 417 | 6.0% | Study Area | 417 | 9.4% |
| Nearby | 621 | 9.0% | Nearby | 517 | 11.7% |
| Van CBD | 637 | 9.2% | Van CBD | 819 | 18.5% |
| Van Other | 3059 | 44.1% | Van Other | 1906 | 43.1% |
| North Shore | 381 | 5.5% | North Shore | 113 | 2.6% |
| North of Fraser | 1005 | 14.5% | North of Fraser | 387 | 8.8% |
| South of Fraser | 817 | 11.8% | South of Fraser | 261 | 5.9% |
| TOTAL | 6937 | 100.0% | | 4420 | 100.0% |

Once it was determined what the peak hour trip interchange between the various areas was it could be determined what roadways would be utilized for trips from the various areas.

FIGURE 4.2 identifies the study area network locations through which travel originating within the study area or destined to the study area must pass as well as the percentage of travel generated by 1Kingsway that would manifest itself at these locations.

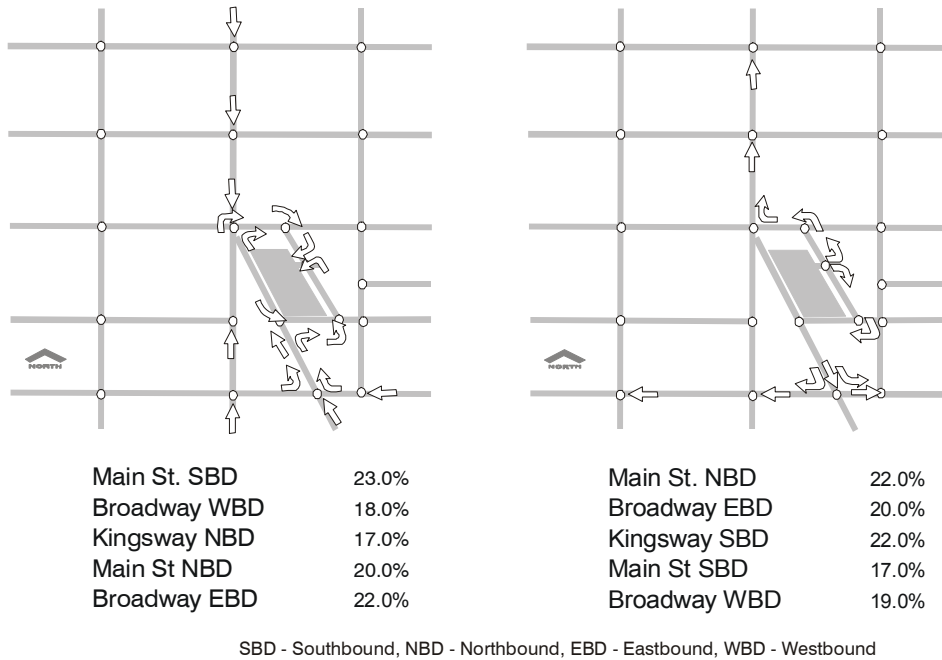


FIGURE 4.2 AM PEAK HOUR TRIP DISTRIBUTION

These trip percentages were applied to the AM and PM peak hour trip generation estimates.

4.3 MODAL COMPOSITION OF GENERATED TRIPS

ITE vehicle trip generation Rates are based on a variety of stand-alone land uses many of which are located sub-urban areas which are auto oriented. It was therefore necessary to apply modal usage assumptions that were reflective of the areas modal utilization.

The emme/2 trip tables that define area to area trip interchange also define the modal composition of these trips in terms of pedestrians, cyclists, transit patrons, goods vehicle operators, auto passengers, auto drivers.

FIGURE 4.3 describes the modal composition of trips that are forecast to be generated by the 1 Kingsway development.

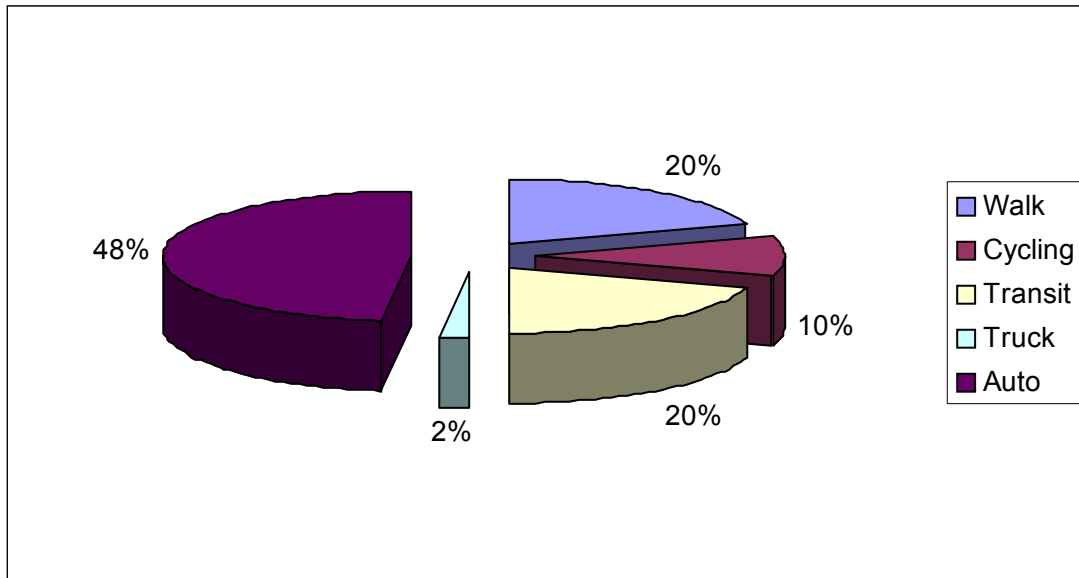


FIGURE 4.3 AM PEAK HOUR MODAL DISTRIBUTION OF SITE GENERATED TRAFFIC

These modal distributions were applied to the total trip distributions to identify walk, bicycle and vehicular trip distributions. Intersection demand distributions by mode were then modified to reflect development travel.

4.4 Micro-simulation Modeling

The transportation assessments were undertaken using a micro-simulation model.

The study area was modeled using version 5.1 of the SYNCHRO model. FIGURE 4.4 describes the SYNCHRO networks that were developed. Two versions of the model representing the weekday AM and PM peak hour demand were developed.

Demand Data

Intersection demand profiles for all analysis periods were developed from the most current intersection counts provided by the City of Vancouver. These counts identified pedestrians, cyclists, buses, trucks, and autos. A measured saturation flow of 1900 vehicles per hour of green was utilized in both AM and PM peak hour simulations.

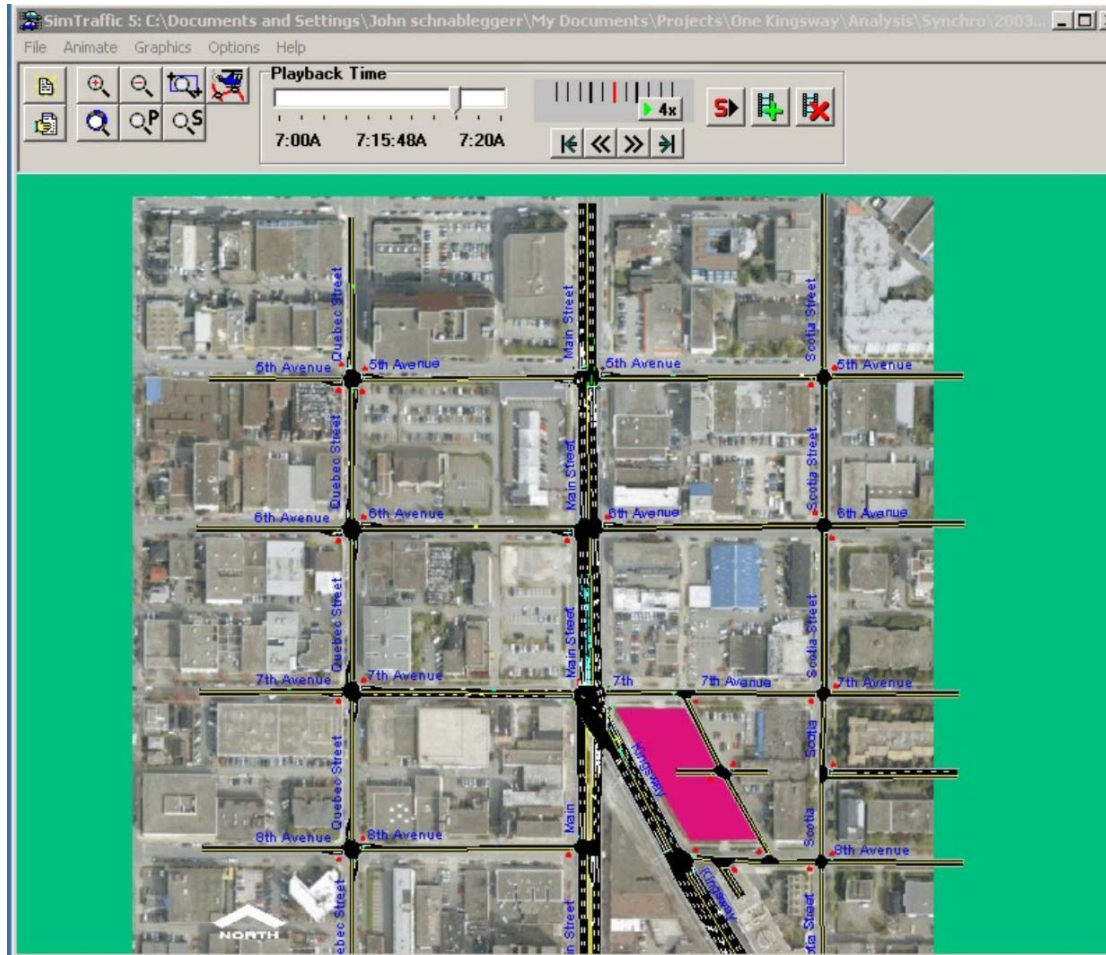


FIGURE 4.4 STUDY AREA SYNCHRO NETWORK

Roadway Geometry

Roadway geometry was validated through field observations.

Signal Timing Plans

Current signal timing plans were obtained from the City of Vancouver.

Model Calibration

The SYNCHRO models representing weekday demand profiles were run and approach vehicle queue formation predictions were compared with observed queue formations during comparative demand periods. Left turn and through queues on each signalized intersection approach within each demand period fell within the 50th and 95th percentile queuing predictions. This level of compliance ensures that the models are accurately reflecting observed conditions and can be used to assess development impacts.

Measures of Effectiveness

In order to accurately characterize the performance of the transportation network under study the following performance indicators, the majority of which are produced by SYNCHRO, were utilized:

Traveler Trip Time – The total time spent by all travelers in the network during the AM or PM peak hour.

Traveler Stops – The total number of stops that would be encountered by all travelers during the AM or PM peak hour.

Intersection Queuing - The Queuing Penalty is a quantification of the effects of queuing. It is calculated by multiplying the volume of vehicular traffic affected by blocking by the percent of time vehicles are blocked. The percent of time blocked is the average of the 50th and 95th percentile queuing block times.

Signalized Intersection Performance - Signalized intersection performance was characterized by average traveler delay for persons passing through the intersection.

Network Performance – SYNCHRO produces an overall performance index to characterizes the overall performance of each scenario taking into account traveler delay, vehicle queuing, and traveler stops

$PI = (D*1 + St*10 + QP*100)/3600$, where

PI = Performance Index

D = Traveler Signal Delay (s)

QP = Queuing Penalty

St = Traveler Stops

Site Accessibility – Accessibility effects are identified as being improved, degraded, or unchanged.

Traveler Safety - Traveler safety effects were characterized as being improved, degraded or unchanged.

4.5 Base Case Network Performance

The performance of the existing transportation network, in terms of person stops, person delay, queuing performance, overall network performance, and average signalized intersection person delay, under AM and PM peak hour demand profiles is summarized in TABLE 4.3

TABLE 4.3 BASE CASE PERFORMANCE

| | Existing AM Peak Hr. and Network | Existing PM Peak Hr. and Network |
|---|---|---|
| Person Stops (#) | 15,400 | 17,500 |
| Person Delays (hrs) | 241 | 1,144 |
| Queuing Penalty | 727 | 253 |
| Performance Index | 177 | 1,070 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | |
| Broadway & Kingsway | 27.3 | 22.1 |
| Broadway & Main | 19.4 | 21.9 |
| Broadway & Quebec | 11.5 | 12 |
| 7 Ave & Kingsway | 21.9 | 26.1 |
| 5 Ave & Main | 2.4 | 8.3 |

There are currently few problems on the study area transportation networks under AM and PM peak hour demand in terms of excessive delay or intersection queuing. The intersection of Main Street/7th Avenue and Kingsway presents the only accessibility and safety issues. Seventh Avenue is a key east west pedestrian and cycling route connecting the west and east portions of the Mount Pleasant Community. The configuration of this intersection required the placement of east west sidewalks just south of the intersection thereby creating separate crossings of Main Street and of Kingsway. To improve accessibility to land uses south of 7th Avenue a northbound right turn from Main Street to Kingsway is permitted. This movement, which is at an acute angle, creates an unexpected conflict with east west pedestrian movements. Access to areas east of Kingsway and south of 7th Avenue is not

accommodated at the intersection of Main Street/Kingsway/7th Avenue because of the upstream intersection effects this would create.

The 2003 base case AM and PM peak hour models were modified to reflect the trip generation and distributions developed for the 1 Kingsway project. The performance of the 2003 AM and PM networks with 1 Kingsway are shown in TABLES 4.4 and 4.5.

TABLE 4.4 1 KINGSWAY BASE CASE PERFORMANCE

| | AM Peak Hour | | PM Peak Hour | |
|---|--------------|--------|--------------|--------|
| | Existing | 1 KGW | Existing | 1 KGW |
| Person Stops (#) | 15,400 | 15,825 | 17,500 | 18,160 |
| Person Delays (hrs) | 241 | 253 | 1,144 | 1,410 |
| QP | 727 | 444 | 253 | 269 |
| PI | 177 | 182 | 1,070 | 1,330 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | | |
| Broadway & Kingsway | 27.3 | 28.1 | 22.1 | 22.3 |
| Broadway & Main | 19.4 | 20.1 | 21.9 | 22 |
| Broadway & Quebec | 11.5 | 11.5 | 12 | 12 |
| 7 Ave & Kingsway | 21.9 | 23.2 | 26.1 | 27.3 |
| 5 Ave Kingsway | 2.4 | 2.6 | 8.3 | 8.3 |

As can be seen from the performance measures in TABLE 4.4, travel demand swayed by 1 Kingsway has very little effect on the operation of the transportation network in terms of adding travel delay or the creation of intersection queuing problems.

5.0 1 KINGSWAY ACCESS ACCOMMODATION STRATEGIES

With the addition of 1 Kingsway travel demand the accessibility and safety issues of the current study area transportation network remain. The three measures identified in FIGURE 5.1 were identified to improve pedestrian, cycling and vehicular access to the 1 Kingsway site. The three measures included:

- Provision of a southbound left turn phase at the intersection of Main/Kingsway and 7th Avenue;
- Prohibition of the northbound right turn from Main Street to Kingsway at the intersection of Main/Kingsway and 7th Avenue; and
- Provision of a full traffic signal at Kingsway and 8th Avenue.



FIGURE 5.1 CANDIDATE ACCESS IMPROVEMENT MEASURES

Each of these measures was modeled using the AM and PM SYNCHRO models. Where necessary traffic was re-assigned.

5.1 Main/Kingsway & 7th Avenue Southbound Left Turn Phase

TABLES 5.1 and 5.2 describe the performance of this measure in relation to AM and PM peak hour base case performance.

TABLE 5.1 AM PEAK HOUR PERFORMANCE MAIN/KINGSWAY/7TH AVENUE SOUTHBOUND LEFT TURN PHASE

| AM Peak Hour | Base Case | | Main/Kingsway/7 th Ave SBD Turn Phase |
|---|-----------|--------|--|
| | Existing | 1 KGW | |
| Person Stops (#) | 15,400 | 15,825 | 20,800 |
| Person Delays (hrs) | 241 | 253 | 354 |
| QP | 727 | 444 | 444 |
| PI | 177 | 182 | 324 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 27.3 | 28.1 | 28.1 |
| Broadway & Main | 19.4 | 20.1 | 20.1 |
| Broadway & Quebec | 11.5 | 11.5 | 11.5 |
| 7 Ave & Kingsway | 21.9 | 23.2 | 128.1 |
| 5 Ave Kingsway | 2.4 | 2.6 | 1.2 |

As can be seen this results in significant additional delay at the Kingsway and 7th Avenue signal.

**TABLE 5.2 PM PEAK HOUR PERFORMANCE MAIN/KINGSWAY/7TH AVENUE
SOUTHBOUND LEFT TURN PHASE**

| PM Peak Hour | Base Case | | Main/Kingsway/7 th Ave SBD Turn Phase |
|---|-----------|--------|---|
| | Existing | 1 KGW | |
| Person Stops (#) | 17,500 | 18,160 | 24,000 |
| Person Delays (hrs) | 1,144 | 1,410 | 1,450 |
| QP | 253 | 269 | 948 |
| PI | 1,070 | 1,330 | 1,360 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 22.1 | 22.3 | 22.3 |
| Broadway & Main | 21.9 | 22 | 22 |
| Broadway & Quebec | 12 | 12 | 12 |
| 7 Ave & Kingsway | 26.1 | 27.3 | 158.3 |
| 5 Ave Kingsway | 8.3 | 8.3 | 5.3 |

While improving southbound access to 1 Kingsway, this measure will increase transit and cycling delays at the intersection of Main/Kingsway/7th Avenue and will also cause significant increases in delay to a vehicular traffic moving through the intersection. These delay increases result in significantly increased queuing along Main Street.

5.2 Main/Kingsway & 7th Avenue Northbound Right Turn Prohibition

TABLES 5.3 and 5.4 describe the performance of this measure in relation to AM and PM peak hour base case performance.

**TABLE 5.3 AM PEAK HOUR PERFORMANCE MAIN/KINGSWAY/7TH AVENUE
NORTHBOUND RIGHT TURN PROHIBITION**

| AM Peak Hour | Base Case | | Main/Kingsway/7 th Ave NBD Right Turn Ban |
|---|-----------|--------|---|
| | Existing | 1 KGW | |
| Person Stops (#) | 15,400 | 15,825 | 18,830 |
| Person Delays (hrs) | 241 | 253 | 253 |
| QP | 727 | 444 | 444 |
| PI | 177 | 182 | 182 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 27.3 | 28.1 | 28.1 |
| Broadway & Main | 19.4 | 20.1 | 20.1 |
| Broadway & Quebec | 11.5 | 11.5 | 11.5 |
| 7 Ave & Kingsway | 21.9 | 23.2 | 23.2 |
| 5 Ave Kingsway | 2.4 | 2.6 | 2.6 |

**TABLE 5.4 PM PEAK HOUR PERFORMANCE MAIN/KINGSWAY/7TH AVENUE
NORTHBOUND RIGHT TURN PROHIBITION**

| PM Peak Hour | Base Case | | Main/Kingsway/7 th Ave NBD Right Turn Ban |
|---|-----------|--------|---|
| | Existing | 1 KGW | |
| Person Stops (#) | 17,500 | 18,160 | 18,150 |
| Person Delays (hrs) | 1,144 | 1,410 | 1,400 |
| QP | 253 | 269 | 269 |
| PI | 1,070 | 1,330 | 1,330 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 22.1 | 22.3 | 22.2 |
| Broadway & Main | 21.9 | 22 | 22 |
| Broadway & Quebec | 12 | 12 | 12 |
| 7 Ave & Kingsway | 26.1 | 27.3 | 27.3 |
| 5 Ave Kingsway | 8.3 | 8.3 | 8.3 |

This measure will improve pedestrian and cyclist comfort and safety. The prohibition results in marginally reduced accessibility to land uses along Kingsway south of 7th Avenue. Current hourly demand for this movement are in the range of 10 to 15 vehicles per hour.

5.3 Traffic Signal at Kingsway and 8th Avenue

The limited accessibility to 1 Kingsway at the intersection of Kingsway and 7th Avenue will result in an increased use of the intersection of Kingsway and 8th Avenue. This intersection is currently not signalized and increased activity will result in increased delays and reduced safety levels. Therefore the installation of a traffic signal was also assessed. TABLES 5.5 and 5.6 describe the performance of this measure in relation to AM and PM peak hour base case performance.

TABLE 5.5 AM PEAK HOUR PERFORMANCE KINGSWAY AND 8th AVENUE TRAFFIC SIGNAL

| AM Peak Hour | Base Case | | Kingsway & 8 th Avenue Traffic Signal |
|---|-----------|--------|---|
| | Existing | 1 KGW | |
| Person Stops (#) | 15,400 | 15,825 | 16,160 |
| Person Delays (hrs) | 241 | 253 | 241 |
| QP | 727 | 444 | 474 |
| PI | 177 | 182 | 172 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 27.3 | 28.1 | 22.5 |
| Broadway & Main | 19.4 | 20.1 | 14.2 |
| Broadway & Quebec | 11.5 | 11.5 | 11.5 |
| 7 Ave & Kingsway | 21.9 | 23.2 | 25.6 |
| 5 Ave Kingsway | 2.4 | 2.6 | 2.7 |

TABLE 5.6 PM PEAK HOUR PERFORMANCE KINGSWAY AND 8th AVENUE TRAFFIC SIGNAL

| PM Peak Hour | Base Case | | Kingsway & 8 th Avenue Traffic Signal |
|---|-----------|--------|---|
| | Existing | 1 KGW | |
| Person Stops (#) | 17,500 | 18,160 | 16,900 |
| Person Delays (hrs) | 1,144 | 1,410 | 1,900 |
| QP | 253 | 269 | 256 |
| PI | 1,070 | 1,330 | 1,300 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 22.1 | 22.3 | 15.4 |
| Broadway & Main | 21.9 | 22 | 20.8 |
| Broadway & Quebec | 12 | 12 | 12 |
| 7 Ave & Kingsway | 26.1 | 27.3 | 24.5 |
| 5 Ave Kingsway | 8.3 | 8.3 | 6.4 |

This measure will provide improved pedestrian, cyclist, and vehicular access to 1 Kingsway without significant effects on upstream and downstream signalized intersection operations.

6.0 ASSESSMENT OF FUTURE TRANSPORTATION CHANGES ON THE PROJECT

There are two significant network changes that could potentially affect the future accessibility to 1 Kingsway. These two initiatives, identified in FIGURE 6.1 include:

- The extension of the Millennium SkyTrain line along Broadway (with a station in the vicinity of Main Street); and
- The Kingsway/Quebec Connector.

Neither of these initiatives is included in either a City or TransLink implementation program.

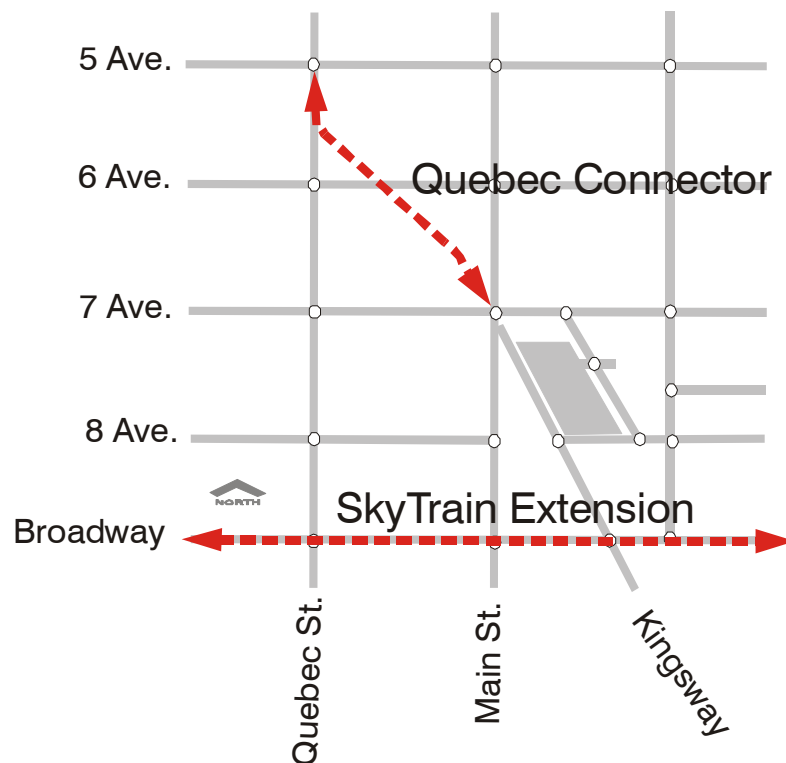


FIGURE 6.1 POTENTIAL FUTURE TRANSPORTATION NETWORK CHANGES

6.1 Millennium SkyTrain Extension

The Millennium SkyTrain extension will improve transit accessibility to 1 Kingsway. The degree of effect of such an extension in the near term would be minimal given that current transit services have fully penetrated the available transit market. This is verified by current ridership on the Millennium line east of Commercial Street which is in the range of bus ridership prior to the implementation of the new SkyTrain line.

6.2 The Kingsway/Quebec Connector.

The Kingsway to Quebec Street Connector is intended to resolve the complexity issues at the Main/Kingsway/7th Avenue intersection. The Connector concept would close 7th Avenue access to and from Main Street and Kingsway. A full assessment of the Connector is beyond the scope of this study. The connector was however modeled to determine the effects on access to 1Kingsway. The closure of 7th Avenue would cause a re-distribution of traffic on Kingsway and Main Street. Traffic that now utilizes 7th Avenue to access Kingsway would utilize the Connector.

TABLES 6.1 and 6.2 describe the performance of the Quebec Connector in relation to AM and PM peak hour base case performance.

TABLE 6.1 AM PEAK HOUR PERFORMANCE QUEBEC CONNECTOR

| AM Peak Hour | Base Case | | Quebec Connector |
|---|-----------|--------|------------------|
| | Existing | 1 KGW | |
| Person Stops (#) | 15,400 | 15,825 | 12,940 |
| Person Delays (hrs) | 241 | 253 | 208 |
| QP | 727 | 444 | 444 |
| PI | 177 | 182 | 131 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 27.3 | 28.1 | 21 |
| Broadway & Main | 19.4 | 20.1 | 14.3 |

| | | | |
|-------------------|------|------|------|
| Broadway & Quebec | 11.5 | 11.5 | 10.4 |
| 7 Ave & Kingsway | 21.9 | 23.2 | 17.5 |
| 5 Ave Kingsway | 2.4 | 2.6 | 3.9 |

TABLE 6.2 PM PEAK HOUR PERFORMANCE QUEBEC CONNECTOR

| PM Peak Hour | Base Case | | Quebec Connector |
|---|-----------|--------|------------------|
| | Existing | 1 KGW | |
| Person Stops (#) | 17,500 | 18,160 | 18,150 |
| Person Delays (hrs) | 1,144 | 1,410 | 597 |
| QP | 253 | 269 | 398 |
| PI | 1,070 | 1,330 | 514 |
| <u>Signalized Intersection Performance Average Person Delay (sec)</u> | | | |
| Broadway & Kingsway | 22.1 | 22.3 | 21.7 |
| Broadway & Main | 21.9 | 22 | 23.3 |
| Broadway & Quebec | 12 | 12 | 14.2 |
| 7 Ave & Kingsway | 26.1 | 27.3 | 24.4 |
| 5 Ave Kingsway | 8.3 | 8.3 | 6.6 |

The Quebec Connector will reduce delay at the intersection of Main/Kingsway/7th Avenue for all modes because of the simplification of signal phasing. It would also enhance pedestrian and cycling comfort and safety. Accessibility to 1 Kingsway is unchanged.

7.0 PARKING AND LOADING REQUIREMENTS

The determination of parking requirements for the 1 Kingsway complex is based on community centre ,library, and restaurant area , as well as day care and residential land uses. The determination of by-law required parking and loading requirements of the 1 Kingsway Project in relation to the various uses identified by the project architect is shown in TABLE 7.

TABLE 7.1 1 KINGSWAY PARKING MANDATED BY-LAW REQUIREMENTS

| Parking Requirements | | | REQUIRED |
|--|---------------|----------------|---------------|
| | AREA | UNIT | |
| ASSEMBLY | | | |
| Library <i>total</i> | 657.80 | | 35 |
| Community Centre <i>total</i> | 1713.40 | | 92 |
| RESTAURANT (4.2.5.10) 1/100sm to 300sm, then 1 per additional 50sm | 120.00 | | 1 |
| CHILD CARE (program) 9 staff members 12 infants 12 toddlers 25 pre-schoolers | | 9 staff | 2 |
| **program 1 stall per 8 children | | 49 children | 6 |
| TOTAL PUBLIC STALLS | | | 136.61 |
| RESIDENTIAL 1 per 70 sm, not > 2.2 stalls/unit residential | 99 7219.00 | units area | 103.13 |
| TOTAL STALLS | | | 239.74 |

These Bylaw mandated requirements were reviewed and assessed to ensure that parking and loading stall requirements were in congruence with sustainability as well as commercial objectives.

The parking requirements for the residential component of the development are the minimum currently required under Bylaw. Although the site trip generation and modal characteristics confirm the appropriateness of the residential parking stall requirements for residents some relaxation with respect to visitor parking should be accommodated given the extent of parking available for other uses.

The community centre uses produce a parking requirement which appeared excessive given the building's sustainability objectives as well as the modal distribution of trips (less than half of trips generated by public uses will be made by auto) generated by community centre uses.

Based on the trip generation analysis the community centre is expected to produce the maximum parking requirements in the PM peak hour (70 vehicle trips with 26 entering and 44 leaving). This would consume 70 out of 119 available stalls.

In order to refine the community centre parking needs parking utilization surveys were undertaken from September 1, 2003 to October 8, 2003 at the following existing community centers:

- Mr. Pleasant;
- Dunbar;
- Roundhouse; and
- Douglas Park.

These centers were identified as having similarities with the proposed 1 Kingsway centre. Observations were also undertaken at Hastings Library on October 28, 2003 to assist in the estimation of library related parking in an area that is well served by public transit. Parking occupancies were observed every half hour by community centre and/or library staff from 09:00 to 19:00. Hastings library observations were conducted from 10:00 to 20:00. FIGURES 7.1 to 7.5 describe the parking utilizations observed.

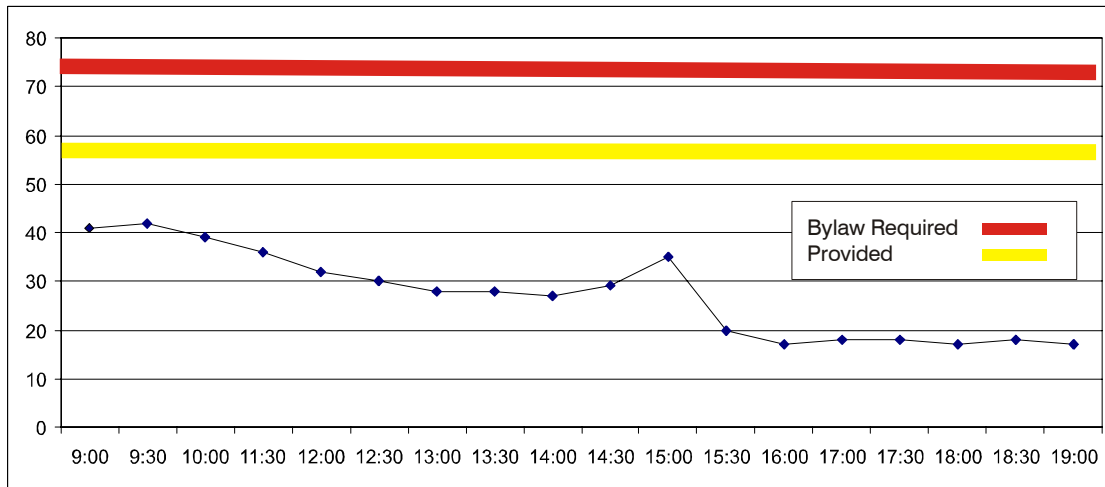


FIGURE 7.1 MT. PLEASANT COMMUNITY CENTRE PARKING UTILIZATION

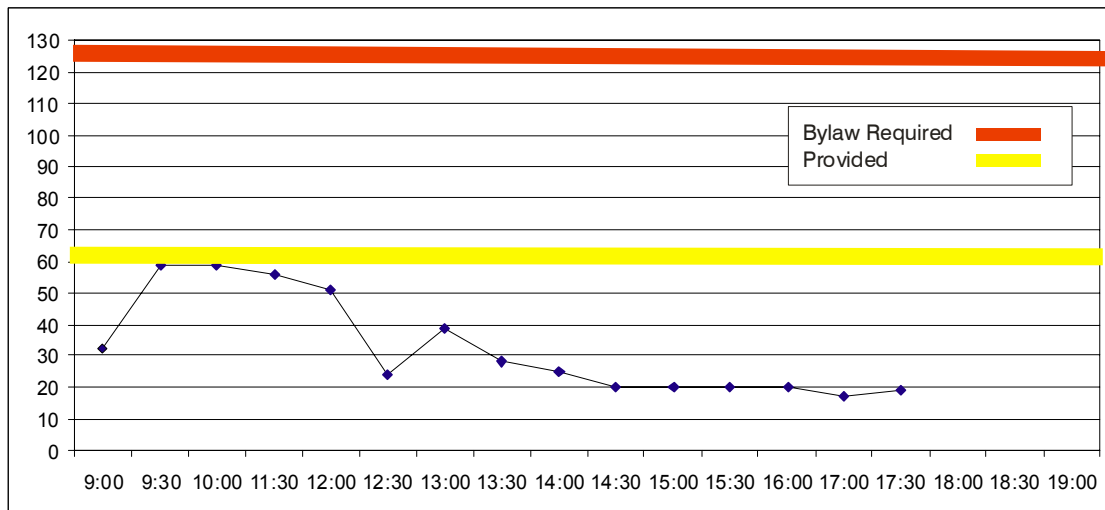


FIGURE 7.2 DUNBAR COMMUNITY CENTRE PARKING UTILIZATION

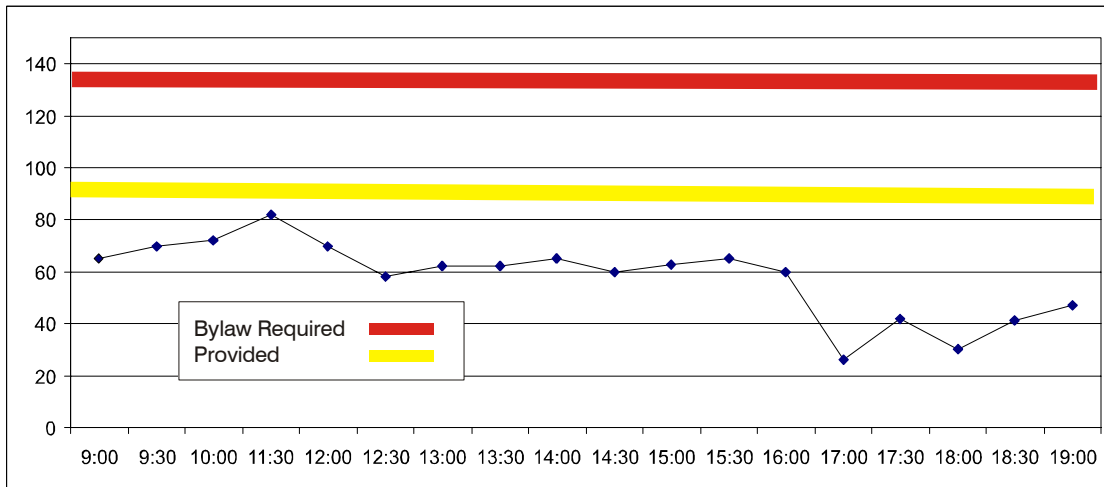


FIGURE 7.3 ROUNDHOUSE COMMUNITY CENTRE PARKING UTILIZATION

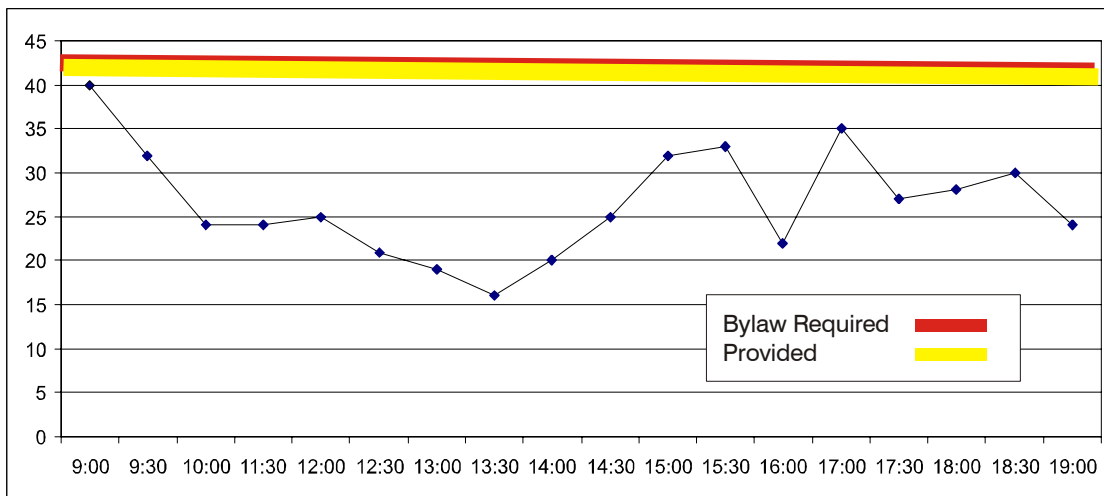


FIGURE 7.4 DOUGLAS PARK COMMUNITY CENTRE PARKING UTILIZATION

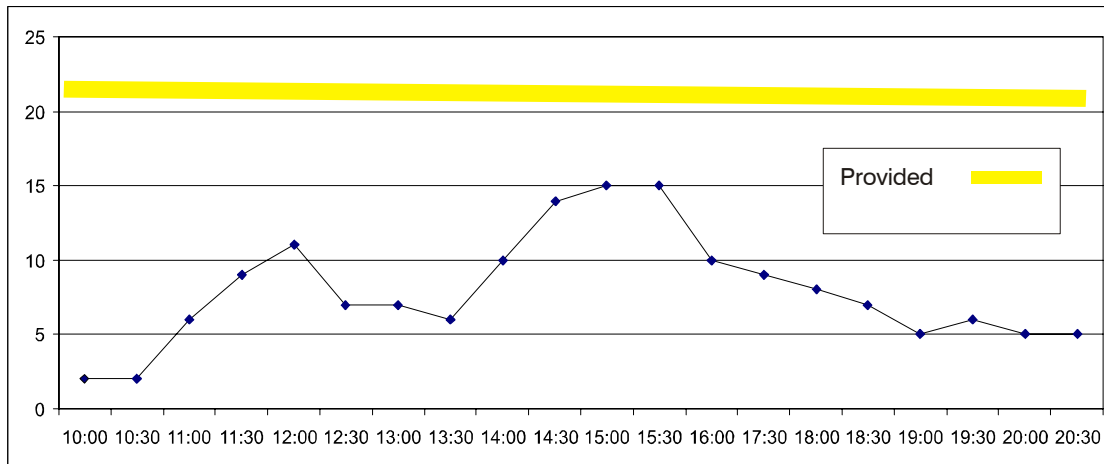


FIGURE 7.5 HASTINGS LIBRARY PARKING UTILIZATION

As can be seen from the parking utilization figures the peak parking utilization is lower than the by-law mandated requirement in all cases. As well the library utilization is also lower than what is provided.

Community centre assembly areas to peak parking utilization ratios were developed for each centre observed and this ratio was applied to the 1 Kingsway square footage. Based on this square footage comparison a reduction of 52 stalls would be adequate. This would however result in a situation which leaves no margin of variance. The 52 stall reduction was reduced to a 44 stall reduction to provide 91 parking stall equivalents (handicapped stalls being counted as two regular stalls).

The residential parking provision would be 98 parking stall equivalents (92 car and 3 handicapped, handicapped stalls being the equivalent of two regular stalls). Five of these stalls would be designated for visitor parking which would be located in the public parking area. The visitor parking allocation reflects a recommended 50% reduction in Bylaw mandated visitor parking. TABLE 7.2 describes the allotment of recommended stalls;

TABLE 7.2 1 KINGSWAY RECOMMENDED PARKING STALL ALLOTMENT

| | | PROPOSED |
|----------------------|---|---------------|
| PUBLIC STALLS | REGULAR | 67 |
| | SMALL (max. 25%) | 22 |
| | <i>**counts as two reg. stalls</i> HANDICAPPED (2 required) | 2 |
| | | 91.00 |
| RESIDENTIAL | REGULAR | 69 |
| | SMALL (max. 25%) | 23 |
| | <i>**counts as two reg. stalls</i> HANDICAPPED (3 required) | 3 |
| | | 95.00 |
| TOTAL STALLS | | 186.00 |

Not: Handicapped parking stalls are the equivalent of 2 regular stalls.

TABLE 7.3 summarizes the loading requirements for the building.

TABLE 7.3 1 KINGSWAY LOADING REQUIREMENT

| | | REQUIRED | PROPOSED |
|-----------------------------|--------------------------|----------|----------|
| Class B requirement factors | | | |
| Civic: | | | |
| 1 stall/2800 sm gross | | | |
| | VPL and C. Centre 3931m2 | 1 | |
| | CLASS A | 0 | 0 |
| | CLASS B | 1 | 1 |

It is recommended that a loading area for larger trucks (trucks that cannot enter the parking garage) be established adjacent to 7th Avenue near the front doors of the residential area. This will accommodate larger moving trucks as well as larger City service vehicles.

TABLE 7.4 summarizes the bicycle parking for the building.

TABLE 7.4 1 KINGSWAY BICYCLE REQUIREMENT

| | | REQUIRED | PROPOSED |
|---|----------------------|------------|----------|
| <i>PUBLIC ASSEMBLY 6.2.3.1</i> | | | |
| Class A 1 per 500 m2 assembly (less fitness) | class A | 4.1 | 4.0 |
| Class B 6 per 1500m2 of floor area (less fitness) | class B | 1.4 | 1.0 |
| <i>FITNESS CENTRE 6.2.3.3</i> | | | |
| Class A 1 per 250 m2 assembly | class A | 1.2 | 1 |
| Class B 6 per 500m2 of floor area | class B | 6.0 | 6.0 |
| | TOTAL Class A | 5.4 | 5 |
| | TOTAL Class B | 7.4 | 7 |
| <i>RESIDENTIAL</i> | | | |
| Class A 1.25 per dwelling unit | class A | 124 | 124 |
| Class B 6 for project over 20 units | class B | 6 | 6 |

8.0 CONCLUSIONS AND RECOMMENDATIONS

The 1 Kingsway project has very small effect on the area transportation system because of the relatively low auto utilization in this portion of the Mt. Pleasant Community. These modal choices can be expected to be reflected in travel generated by 1 Kingsway given the new community center's access to good pedestrian, cycling and transit infrastructure and the provision of cycling trip end facilities within the development. Recommendation with respect to access, parking and loading requirements are provided in this context as well as broader sustainability objectives.

8.1 Parking and Loading

Given the location of 1 Kingsway and its proximity to excellent public transportation it is recommended that 186 parking stalls be provided. This translates into 136 regular, 45 small and 5 handicapped stalls for public and residential uses.

It is recommended that 1 class B loading stall be provided. In addition it is recommended that a large truck parking area be provided along 7th Avenue.

A total of 5 class A and 7 class B bicycle parking stalls be provided for the public component of the building and 124 class A and 6 class B bicycle parking stalls be provided for the residential component.

8.2 Access

Based on the analysis undertaken the following access related recommendations were developed.

1. Given that over 80% of vehicular access will have to move through the intersection of Kingsway and 8th Avenue it is recommended that a full traffic signal be installed at this intersection. This will provide an additional signal protected crosswalk which will facilitate safe and efficient pedestrian, cycling and transit access. As well other vehicular traffic generated by the site will also be able to enter and leave the site safely and efficiently. The cost of such a signal would be in the vicinity of \$80,000.
2. It is recommended that TransLink be requested to provide a southbound transit stop at the main building entrance. If a shelter is provided the provision of transit shelter functions provided through building features such as canopies or over-hangs should be pursued.
3. The northbound left turn from Main Street to Kingsway at the intersection of Main/Kingsway/7th Avenue be prohibited.
4. Although adjacent on-street parking and loading is not addressed by building parking by-law requirements (as all required parking must be provided within the development) there are a number of issues that will have to be monitored and carefully managed. These include:
 - Street level loading – building deliveries as well as drop-off/pick up activity may not be containable to the underground structure of the building if on-street space is perceived to be available. Some stopping controls may be required in the vicinity of the intersections of the lane and 8th Avenue and 7th Avenue to ensure sight lines are not compromised; and
 - Moving vans – there may be some reluctance to drive moving vans into the parkade resulting in vans being parked on 7th Avenue adjacent to the residential street entrance. Such activity should be discouraged and/or controlled to ensure that site access safety is not compromised.

I trust this adequately addresses site traffic and parking issues. If you require additional information and/or clarification please contact the undersigned at 604 684-4488.

Your truly,

G.D. HAMILTON ASSOCIATES
CONSULTING LTD.



per: J. Schnablegger, P. Eng
Senior Project Manager