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# FINAL REPORT - Traffic Analysis Report

## Port Coquitlam Recreation Complex

### Port Coquitlam, BC

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Howes Technical Advantage Ltd.  
April 2017

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## Contents

Contents .....	1
1. Introduction .....	3
1.1. Background and Proposed Development .....	3
1.2. Study Area .....	3
2. Analysis Methodology and Assumptions .....	7
2.1. Analysis Horizon .....	7
2.2. Analysis Methodology .....	7
2.3. Synchro Analysis .....	7
2.4. Analysis Assumptions .....	8
3. Existing Conditions .....	10
3.1. Observations .....	10
3.2. Data Collection .....	10
3.3. Existing PM 2016 Traffic Volumes .....	10
4. Site Traffic .....	15
4.1. New Development and Network .....	15
4.2. Site trip generation – New Recreation Complex .....	15
4.3. Site trip generation – Residential and Senior use .....	20
4.4. Total site trips .....	21
4.5. Trip distribution and Assignment – PM Peak .....	21
4.6. Total Site Traffic .....	23
5. Future Background Traffic .....	26
5.1. Future PM 2021 Background Trips .....	26
5.2. Future PM 2021 Background Analysis .....	26
6. Future Total Traffic .....	29
6.1. Future PM 2021 Total Traffic – no improvements .....	29
6.2. Future Planning in Port Coquitlam .....	32
6.3. Trips reduction through use of alternative modes and TDM .....	32
6.4. Future PM 2021 Total Traffic – with improvements .....	32
6.5. Future PM 2026 Total Traffic – with improvements .....	36
6.6. Future Traffic Control – Signalization vs Roundabouts .....	39
7. Summary and Conclusions .....	42

Appendix A – Traffic Count Data – (provided separately as an electronic file)

Appendix B – Synchro Results – (provided separately as an electronic file)

Appendix C – New Recreation Complex Site Plan

## 1. Introduction

Howes Technical Advantage Ltd. was retained by Ventana Construction Corporation (Ventana) to complete a Traffic Analysis Report for the proposed development of the Port Coquitlam Recreation Complex (Complex).

### 1.1. Background and Proposed Development

The redevelopment of the Complex has been under review for a number of years. A new facility will be built on the same site and replaces the existing Complex. Proposed residential and seniors housing will be developed to the south of the site at the location of the previous works yard. Ventana has been hired by the City of Port Coquitlam (the City) to develop the site as a design-build contract.

The existing Recreation Complex is located on the site bounded by Wilson Ave in the north, Mary Hill Road to the west, Kingsway Ave to the east and Kelly Ave to the south. The proposed residential development will be located south of Kelly Ave between Kingsway Ave and Mary Hill Road. There are also few lots north of Kelly Ave which are proposed to be residential development. The site location is shown in **Figure 1**.

The land use around the site includes a West Coast Express (WCE) station located to the north-east of the site as well as the Coast Mountain Bus Company (CMBC) bus depot. The main commercial area is located west and north of the site with a large industrial area to the east of the site.

There is an existing agreement to allocate 30 parking spaces for WCE users on the existing Complex lot. The actual allocated spaces are closer to 100.

The new Complex will replace the existing facility, including the Wilson Centre and Terry Fox Library, and a new facility will be built on the same site providing a wide range of recreation facilities as well as a new library and senior facilities. The new building will also include three sheets of ice, an indoor leisure pool and new fitness facilities.

### 1.2. Study Area

The study area is shown in **Figure 1** together with the study intersections.

#### Existing Road network:

The existing road network is described below<sup>1</sup>:

- |                |   |
|----------------|---|
| ■ Wilson Ave   | This two-lane collector road runs east-west from Reeve St in the west to the intersection with Kingsway Ave to the north-east of the site. This is a main bus route accessing the bus depot. The road pavement is 12m wide with one lane in each direction and parking allowed on both sides. |
| ■ Mary Hill Rd | This is a two-lane collector road running north-south from Kingsway in the north connecting south into the residential neighbourhoods. This road also has transit routes. The road pavement is 11m wide with one lane in each direction and parking is allowed on both sides.                 |
| ■ Kingsway Ave | This is an arterial road and is an important truck route for the City and connects to the Coast Meridian Road and Mary Hill Bypass to the south east. The route connects west through the north of the City Centre to   |

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<sup>1</sup> OCP Bylaw No. 3838

- Kelly Ave  
Lougheed Highway in Coquitlam. The road pavement is 13m wide and there is one lane in each direction with parking allowed on both sides in some places.  
This is a local road connecting from Kingsway Ave in the east to the City neighbourhoods to the west. The road pavement is 10m wide and there is one lane in each direction with parking allowed on both sides in some places.

**Study Area Intersections:**

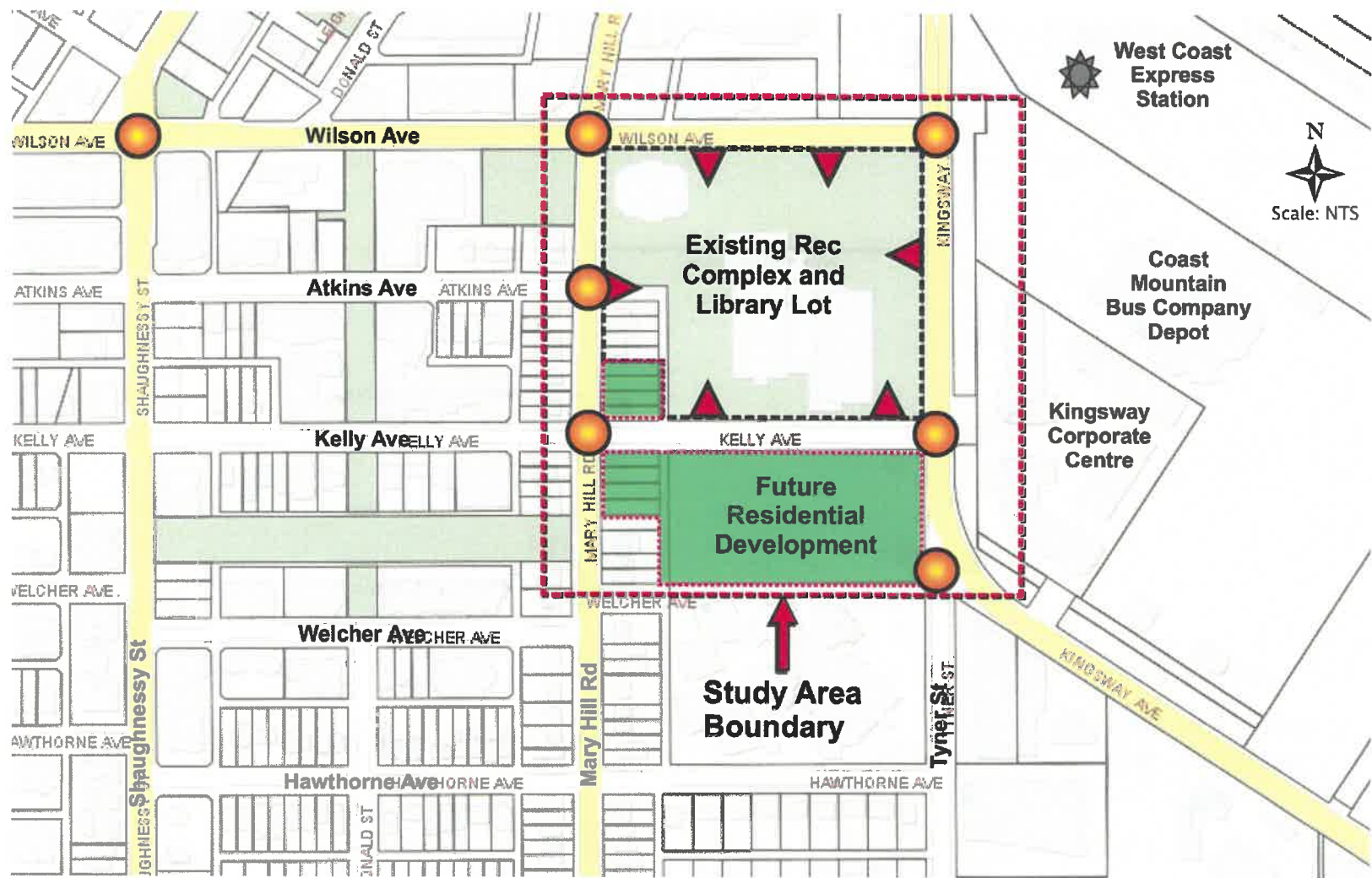
The study area for the traffic study includes this entire area and has 6 main intersections which include:

- Wilson Ave/Mary Hill Rd - signalized
- Wilson Ave/Kingsway Ave - signalized
- Kingsway Ave/Kelly Ave
- Kelly Ave/Mary Hill Rd
- Atkins Ave/Mary Hill Rd (the new Complex entrance is located south of Atkins Ave)
- Kingsway Ave/Tyner St

There are also 5 driveway locations to the existing Complex which form part of the review.

The intersection of Wilson Ave and Shaughnessy Street (signalized) was also reviewed although it was not in the immediate study area.

The existing laning and traffic control for the existing network is shown in **Figure 2**.



**Figure 1**  
**Study Area**



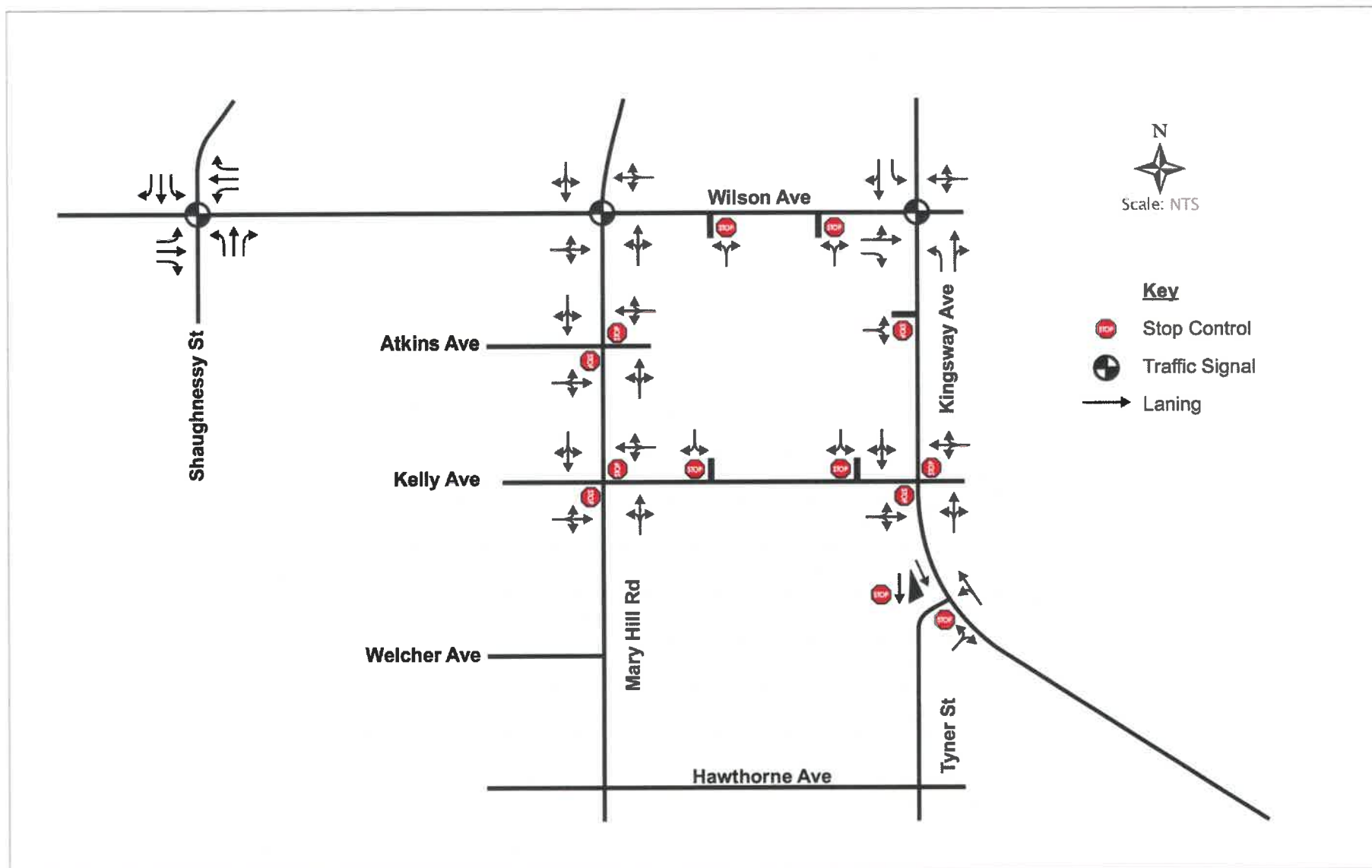


Figure 2  
**Laning and Traffic Control**



## 2. Analysis Methodology and Assumptions

### 2.1. Analysis Horizon

This study analyzed three time horizons:

- 2016 Existing conditions
- 2021 Total Traffic Opening Day
- 2026 Total Traffic Conditions

### 2.2. Analysis Methodology

The methodology used is described below in the following steps:

1. Existing traffic data (December 2016) was collected for all the study intersections and driveways.
2. Proxy data was also collected (January 2017) from two other Recreation Complexes in order to establish the future trip generations.
3. The peak hour was determined from the data collected and the street PM peak hour was determined to be the worst case scenario.
4. The trips to the existing Complex were also higher in the PM peak period.
5. The existing traffic was balanced on the existing network to allow for a solid base for analysis.
6. In order to develop the Future Background traffic:
  - a. The existing Complex traffic was removed
  - b. Existing traffic was increased by the background growth factor
7. The future site traffic was established using the proxy data and the existing Complex data.
8. The future network includes the closing of Kelly Ave and including two main accesses to the new Complex off Mary Hill Rd (West Access) and off Kelly Ave from the east (East Access).
9. The future site traffic was assigned to the network using assumptions based on existing traffic patterns.
10. The total traffic for the future years was completed by adding the future background traffic to the future site traffic.
11. Analysis was undertaken using software tools, engineering judgement and assessment.

### 2.3. Synchro Analysis

The SYNCHRO<sup>2</sup> software suite was used for the traffic analysis for the existing and future analyses. This analysis is based on the procedure and methods of the Highway Capacity Manual (HCM) for signalized and unsignalized intersections.

The key outputs for intersection analysis for each movement and for the overall intersection are:

- Level of Service (LOS): range A – very good to F – very poor
- Volume to capacity ratio v/c
- Average delay per vehicle in seconds
- Queue length in metres (95%) – where the average space for a car is 7m.

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<sup>2</sup> Synchro Software – Version 9.1

The v/c ratio is a ratio of the factored volume to the calculated capacity. Typically in an urban centre, a v/c ratio of 0.90 or lower is desirable for the overall intersection and for critical traffic movements.

The LOS is determined as a function of the average delay per vehicle (reference HCM). The criterion upon which LOS is determined differs for signalized and unsignalized intersections. Typically, a LOS of “D” or better is desirable. Table 1 shows the relationships between LOS and average vehicle delay.

**Table 1: LOS Criteria**

LOS	Average delay for UNSIGNALIZED intersection movements (seconds per vehicle)	Average delay for SIGNALIZED intersection movements (seconds per vehicle)
A	0-10	0-10
B	> 10-15	> 15-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	> 50	> 80

SYNCHRO results reflect conditions using traffic volumes for a 60 minute period; the peak hour. While SYNCHRO results may not reflect the worst or best conditions that may occur during the hour, it does provide a good comparative tool to identify differences in operating conditions related to volume changes, laning changes or signal timing/phasing changes.

For ease of reference only LOS and Queue length were tabulated in the body of the report. All the detailed outputs are shown in Appendix B.

## 2.4. Analysis Assumptions

For analysis purposes the following assumptions were made:

- **Growth Rate:** An annual background growth rate of 1.5% per year was used as confirmed by the City.
- **Network:**
  - The layout and laning for the street network was used as per Existing network.
  - The future network included the closure of Kelly Ave.
- **Laning and configuration:** with the following details:
  - Existing lane widths – actual lane widths vary considerably; existing lane widths were used as actual from 3.0m to a maximum of 3.6m wide (some lanes are wider); measurements were taken from the City GIS and Google Maps.
  - Future lane widths – Minimum of 3.3m for general purpose lanes with 3.1m min for left turn lanes.
  - Grade 0%
  - Heavy vehicles 1% (actual counts <1%)
- **Signal timing:**
  - Signal timings as per City timing sheets.
  - Analysed signal as actuated and un-coordinated.
  - Peak Hour Factor (PHF) – the actual count intersection PHF was used for existing; the future PHF used was 0.92.

- **Pedestrians:**
  - Pedestrians were included as per the peak hour for that intersection (this is conservative as the WCE pedestrian peak is earlier than the street peak).
- **Cyclists:** Very low bicycle use – was included in the vehicle count.
- **Study times of day:**
  - The street peak hour for the AM is between 8:00 and 9:00AM and for the PM is between 4:30 and 5:30PM.

### 3. Existing Conditions

#### 3.1. Observations

The following observations were made from numerous site visits as well as input from the City staff:

1. Traffic currently circulates well through the network.
2. The multiple accesses from the Complex dissipate the traffic across the network.
3. Vehicle and pedestrian volumes in the morning reflect a peak hour that ties in with the WCE departures.
4. The on-site WCE parking is fully utilized.
5. The on street parking which does not have a time limit appears to be used by WCE customers or employees of the Complex.
6. The interconnected parking areas allow on-site circulation for drivers searching for parking at peak times.
7. The well-defined, conveniently located front door drop-off/pick up system at the Complex appears to provide adequate space for this function.
8. It is difficult to make a left turn onto Kingsway Ave at Kelly Ave and at Tyner St at peak times.

#### 3.2. Data Collection

The existing AM and PM traffic volumes, pedestrians, bicycles and heavy vehicles were counted on Wednesday December 7, 2016 and the midday peak for Saturday December 3, 2016. All intersections and driveways were counted as shown in **Figure 1**. The counts were undertaken from 7:00 to 10:00AM and 3:00 to 7:00PM on Wednesday; and 12:00 to 3:30PM on Saturday. The Saturday counts were significantly lower than the weekday peak periods. The weekday counts are shown in **Figure 3**. The count data is included in **Appendix A**.

Based on a review of the data, the street peak hours are from 8:00 to 9:00AM and from 4:30 to 5:30PM. The worst case scenario is the PM peak hour. ***All further analysis includes only the PM peak hour.***

#### 3.3. Existing PM 2016 Traffic Volumes

The existing PM traffic data for the study area was adjusted to the street peak hour and balanced to establish the existing background traffic. This is shown in **Figure 4**.

The 2016 PM peak hour traffic volumes were analyzed based on the existing laning configuration, signal timings and network. The Synchro analysis results showing the Level of service (LOS) and the 95 percentile queue (95% Q) are shown in **Table 2**. The acronyms used as described as follows: EB – eastbound, WB – westbound, SB – southbound, ND – northbound; L – left, T – through, R – right.

The current network operates generally very well. The majority of the intersection movements are operating at LOS D or better except for the left turn movements onto Kingsway Ave at the unsignalized intersections.

- **Wilson Ave/Mary Hill Rd:**
  - The SB movement has a long queue build of close to 100m. This could be mitigated with a signal timing adjustment as well as adding a left turn pocket lane.
- **Wilson Ave/Kingsway Ave:**
  - The SB movement has a long queue of 115m. This needs to be monitored with redevelopment. Some adjustments to the signal time may reduce this slightly.

- ***Kelly Ave/Kingsway Ave:***
  - The WB LT movement fails with an associated queue build up. This is due to the lack of gaps on Kingsway for this movement.
  - The EB movement also experiences delay but drivers at Kelly Ave also have options to exit via another driveway and avoid the left turn delay.
- ***Tyner St/Kingsway Ave:***
  - The EB LT fails with a 50m 95 percentile queue. This is due to the high through movements at this location on Kingsway and the lack of gaps to make the turn.
- ***Wilson Ave/Shaghnessy St:***
  - The NB through movement has a long queue build of ~ 150m. This could be mitigated with a signal timing adjustment and needs to be monitored.

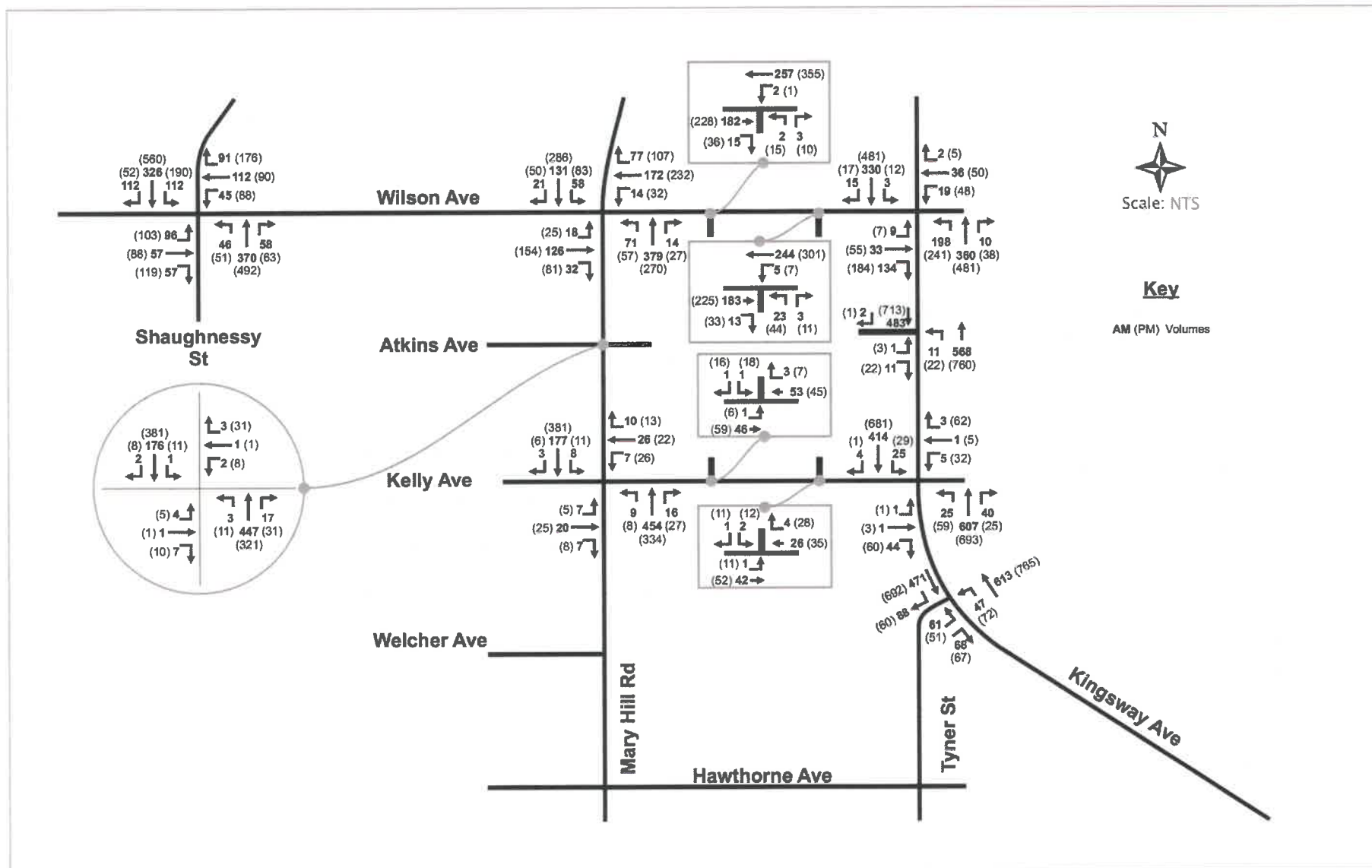


Figure 3  
Existing Weekday Peak Hour Traffic

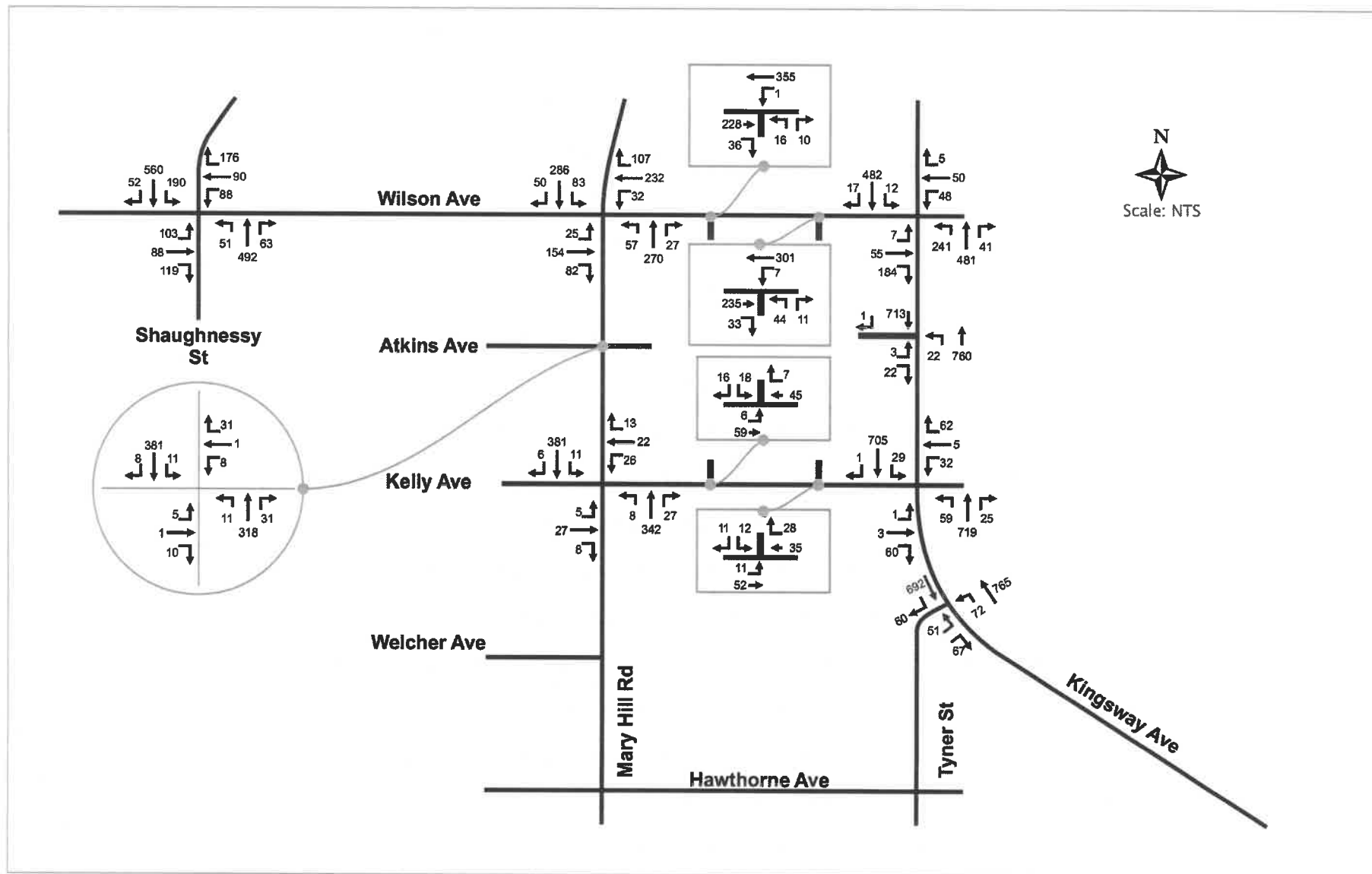


Figure 4  
Existing 2016 Weekday PM Peak Hour Traffic - Balanced



**Table 2: 2016 Existing PM Peak Hour Analysis**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Wilson Ave/Mary Hill Rd	EB LTR	B	42
	WB LTR	C	67
	NB LTR	B	68
	SB LTR	C	98
	Overall	C	
Wilson Ave/Kingsway Ave	EB LT	C	21
	EB R	B	13
	WB LTR	D	31
	NB L	B	39
	NB TR	A	61
	SB L	B	5
	SB TR	C	115
	Overall	B	
Kingsway Ave/Kelly Ave	EB LTR	D	12
	WB L	F	98
	NB LTR	A	3
	SB LTR	A	2
	Overall		
Kelly Ave/Mary Hill Rd	EB LTR	D	8
	WB LTR	D	14
	NB LTR	A	1
	SB LTR	A	1
	Overall		
Atkins Ave/Mary Hill Rd	EB LTR	C	2
	WB LTR	C	4
	NB LTR	A	1
	SB LTR	A	1
	Overall		
Kingsway Ave/Tyner St <sup>3</sup>	EB L	F	50
	EB R	C	7
	NB L	B	4
	Overall		
Wilson Ave/Shaghnessy St	EB L	D	32
	EB T	C	26
	EB R	A	12
	WB L	D	30
	WB T	C	27
	WB R	A	14
	NB L	B	16
	NB T	C	146
	NB R	A	5
	SB L	B	27
	SB T	B	102
	SB R	A	6
	Overall	B	

<sup>3</sup> Laning allowed for NB left turn pocket lane and EB left turn pocket lane

## 4. Site Traffic

### 4.1. New Development and Network

The new Recreation Complex will replace the existing Complex. The current plan for the development is attached in **Appendix C**. The road network will be changed so that Kelly Ave becomes two short cul-de-sacs – one from Mary Hill and one from Kingsway. The new Complex will have two accesses – the west access will connect as a T-junction to Mary Hill Rd between Atkins Ave and Kelly Ave. This west access will have two lanes exiting with a 50m left turn bay. The east access will connect to Kelly Ave in the east. This east access will lead to the west leg of Kelly Ave and Kingsway which will have two lanes approaching Kingsway Ave.

The residential portion of the development has access to the west and east segments of Kelly Ave.

### 4.2. Site trip generation – New Recreation Complex

The trip generation used for this study was based on a number of inputs.

Traffic data was collected at the existing Recreation Centre in early December 2016. This is shown in **Figure 5**. Additional data was collected at two locations for Proxy data. These were chosen as they had similar facilities to the proposed expansion of the Recreational Complex. These two Proxy sites were:

1. Hyde Creek Recreation Centre, City of Port Coquitlam – see **Figure 6**
2. Edmonds Recreation Centre, City of Burnaby – see **Figure 7**

The net floor area for each of these facilities was calculated with input from the City, City of Burnaby and the design team. The types of uses were categorized with associated net floor space. The summary is shown in **Table 3**.

**Table 3: Summary and Comparison of Land Use**

Description	Edmunds Recreation Complex	Hyde Creek Recreation Complex	Existing Recreation Complex	New Recreation Complex
	<i>Net Floor area sq ft</i>	<i>Net Floor area sq ft</i>	<i>Net Floor area sq ft</i>	<i>Net Floor area sq</i>
<b>EXISTING USES</b>				
Library			8,073	8,073
Rinks			32,725	64,575
Offices	4,868		1,594	6,259
Multi-purpose room	915		8,886	4,989
Program Room 1		529	851	714
Program Room 2		646	950	470
Activity Room 1	1,087	768	472	1,399
Activity Room 2	1,485	540	439	1,269
Concession		300	557	633
Café			801	716
Senior Lounge	818		1,677	2,695
Games/Lounge	1,744		956	1,228
Youth Lounge	915	1,584	840	
Preschool program	1,712	460	4,945	2,516
<b>SUB TOTAL #1</b>	<b>13,544</b>	<b>4,827</b>	<b>63,766</b>	<b>95,536</b>
<b>NEW USES</b>				
Pool	17,557	8,255		4,062
Gymnasium	13,918	5,520		6,106
Fitness	3,412	1,345		2,353
Spinning				1,000
Weight Room	7,352	2,500		8,908
Physio		973		1,285
Meeting room 1	226	570		130
Meeting room 2	215	220		142
Meeting room 3	409			764
Sports Hall		1,419		
Racketball ct		800		
Squash ct		620		
Arts Studio	1,519			
<b>SUB TOTAL #2</b>	<b>44,608</b>	<b>22,222</b>	<b>0</b>	<b>24,750</b>
<b>TOTAL</b>	<b>58,152</b>	<b>27,049</b>	<b>63,766</b>	<b>120,286</b>

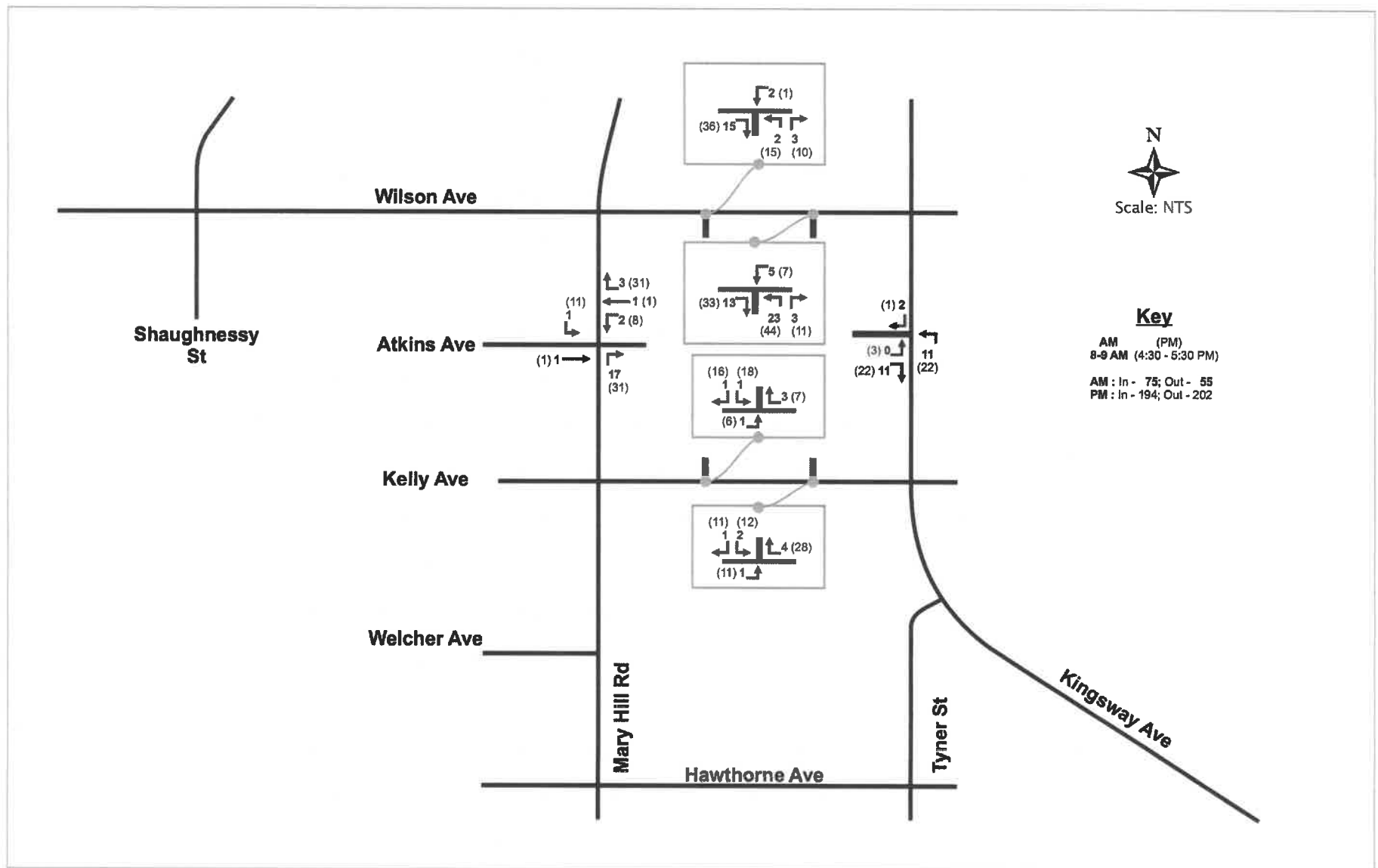


Figure 5  
**Existing Recreation Complex Trip Generation  
 Weekday Peak Hour Traffic**

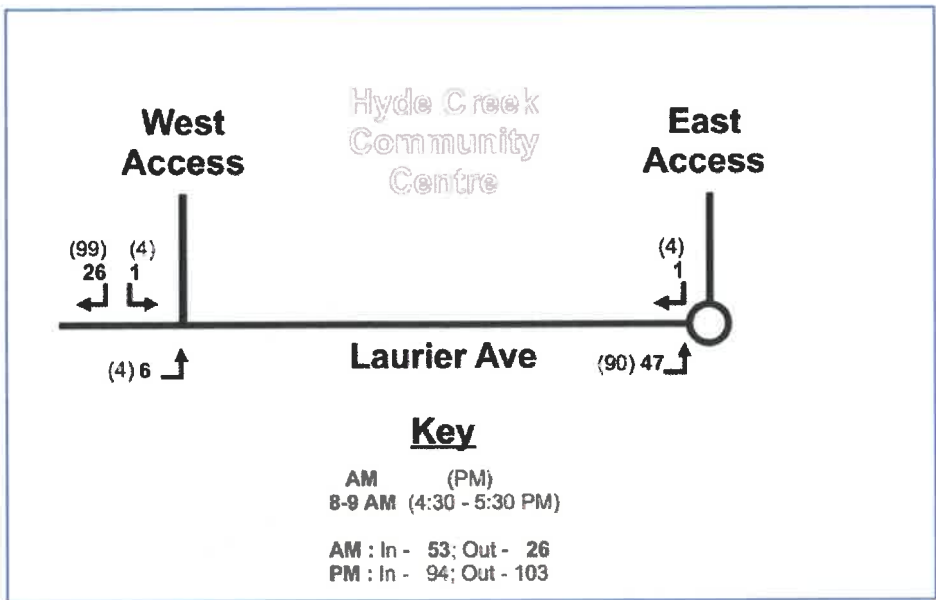


Figure 6: Hyde Creek Recreation Complex – Existing Weekday Peak Hour Traffic

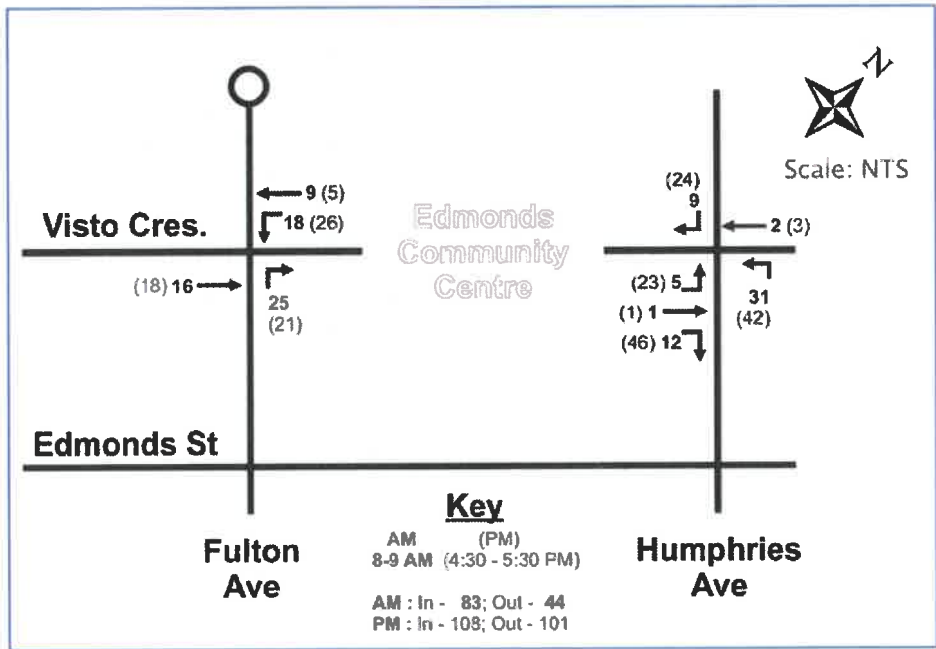


Figure 7: Edmonds Recreation Complex – Existing Weekday Peak Hour Traffic

The trips in and out of the centres were also reviewed and the associated trip rate calculated. This is shown in Table 4.

**Table 4: Trips generated by Recreation Complexes**

Description	Edmunds Recreation Complex	Hyde Creek Recreation Complex	Existing Recreation Complex	New Recreation Complex
<b>TOTAL Net Floor Area</b>	<b>58,152</b>	<b>27,049</b>	<b>63,766</b>	<b>120,286</b>
<b>Trip Generation</b>	<b>Trips</b>	<b>Trips</b>	<b>Trips</b>	<b>Trips calculated</b>
<b>AM Street Peak: 8-9AM</b>				
IN	83	53	75	174
OUT	44	26	55	114
<b>TOTAL</b>	<b>127</b>	<b>79</b>	<b>130</b>	<b>288</b>
%IN	65	67	58	60
%OUT	35	33	42	40
<b>PM Street Peak: 4:30-5:50PM</b>				
IN	108	94	194	404
OUT	101	103	201	425
<b>TOTAL</b>	<b>209</b>	<b>197</b>	<b>395</b>	<b>829</b>
%IN	52	48	49	49
%OUT	48	52	51	51
AM Peak - Trips per Net 1000 sq ft	2.18	2.92	2.04	2.39
PM Peak - Trips per Net 1000 sq ft	3.59	7.28	6.19	6.89

The data was assessed together with the trips rates and the follows approach was suggested and confirmed by the City and design team:

1. The current uses at the Existing Recreation Complex are expanded to 50% larger in the new Complex.
2. Hyde Creek is a better comparator that Edmunds based on:
  - a. the categories of uses and size
  - b. similar trip generation to the current Recreation Complex
3. Trip generation rates were calculated for the new Recreation Complex as follows:
  - a. Using the existing trip generated for the existing Recreation Complex and multiply this by 1.5.
  - b. Add the Hyde Creek trips as per count.
  - c. Add on an additional 5% of the total trips to be conservative.
4. The resulting trip rate for the New Complex falls between the Existing Complex and the Hyde Creek trip rate.

The data and associated trips are summarized in Table 5.

**Table 5: Summary of Site Trips**

	Hyde Creek	Existing Rec Complex	Future Rec Complex
Existing uses	4,800 sqft	63,800 sqft	95,600 sqft
Future uses	22,300 sqft		24,750 sqft
Existing trips AM	79	130	
Existing trips PM	197	395	
Future trips AM			288
Future trips PM			829

The future PM peak hour trips for the Complex are 829 with 404 inbound and 425 outbound.

### 4.3. Site trip generation – Residential and Senior use

Trip generations were established for the residential site to the south of the Complex. The current plan for the development is attached in **Appendix C**. There are three residential areas which will be developed. Firstly, a Seniors Facility is planned on the west side of the site with access only from Kelly Ave off Mary Hill Ave. Secondly, a rental apartment block is planned opposite the Seniors Facility south of Kelly Ave with access only from Kelly Ave off Mary Hill Ave. Thirdly, a residential development in the form of multi-family is proposed on the site south of Kelly Avenue between Mary Hill Ave and Kingsway Ave. This development will have an east and west access off Kelly Ave.

The trip generation used in this analysis was based rates from the ITE<sup>4</sup> trip general manual. As such the rates are conservative and no allowance has been made for trip reduction based on alternative mode use (such as using transit, cycling or walking) and live/work apartments.

The trips were calculated for each land use type using the preferred trip generation rates. A modified rate was used for the Apartment rental based on lower car ownership in rental compared to the United States. The application of the trip rates and the resulting trip generation is presented in **Table 6**.

<sup>4</sup> Institute of Transportation Engineers Trip Generation Manual, 9th Edition.



**Table 6: Trip generation – Residential and Seniors**

LAND USE TYPE			TRIP RATES					
			AM			PM		
ITE Category	per	Source	In	Out	Two way	In	Out	Two way
High Rise Residential Condo/TH	unit	ITE232	0.06	0.28	0.34	0.24	0.14	0.38
% entering			19%			62%		
% leaving			81%			38%		
High Rise Residential Condo/TH	328	ITE232	21	90	112	78	47	125
LAND USE TYPE			TRIP RATES					
			AM			PM		
ITE Category	per	Source	In	Out	Two way	In	Out	Two way
Seniors Living	unit	ITE250	0.07	0.13	0.2	0.14	0.12	0.25
% entering			34%			54%		
% leaving			66%			46%		
Seniors Living	54	ITE250	4	7	11	8	6	14
LAND USE TYPE			TRIP RATES					
			AM			PM		
ITE Category	per	Source	In	Out	Two way	In	Out	Two way
Apartment - rental - ITE 220 modified	unit	mod	0.06	0.28	0.34	0.33	0.21	0.54
% entering			19%			62%		
% leaving			81%			38%		
Apartment - rental - ITE 220 modified	54	mod	3	15	18	18	11	29
TOTAL TRIPS			AM			PM		
			In	Out	Two way	In	Out	Two way
			28	112	141	104	64	168

The future PM peak hour trips for residential, seniors and rental is a total of 168 with 104 inbound and 64 outbound.

#### 4.4. Total site trips

In summary, the new Recreation Complex will generate 829 trips in the PM Peak (inbound and outbound) and the residential development will generate 168 trips in the PM Peak (inbound and outbound). Therefore the total development will generate a total of 997 trips in the PM Peak (inbound and outbound).

#### 4.5. Trip distribution and Assignment – PM Peak

##### Recreational Complex:

There was limited information available regarding the origin and destination of recreation users of the Complex. In order to make assumptions on the future trips distribution, a closer review of the current operation and the split between approaches was undertaken. The existing road network in the vicinity was also taken into account.

The current trips using the existing driveways were reviewed in relation to approach and volume. The review revealed the following:

- Accesses off Wilson:
  - The majority of the trips approach from and depart to the west.
  - Very few trips approach from Kingsway Ave in the east.
- Accesses off Kingsway:
  - Very low left turn movement north onto Kingsway.
  - Higher demand of right turn movements to the south.

- Accesses off Kelly Ave:
  - The peak hour demand is influenced by WCE users accessing the south western side of the parking lot.
  - The majority of traffic using Kelly is destined for the Complex.
- Access off Mary Hill Rd at Atkins Ave:
  - Traffic is distributed both north and south.

With the new Recreation Complex, Kelly Avenue will be closed to through traffic and the only accesses to the Complex are off Mary Hill Rd (west access) and off Kelly Ave (east access). The distribution process took into account the approaches to the current accesses and the redistribution of this with the new accesses.

The existing arterial road network includes a strong connection via Kingsway Ave to Coast Meridian Road in the east. This provides a strong access point for users approaching to and from the north eastern parts of Port Coquitlam and Coquitlam.

The new distribution was calculated with the following approach:

- The percentage of trips using the 6 accesses in the existing centre was calculated for each driveway.
- These percentages were redistributed to the new driveway locations in the following way:
  - Wilson accesses:
    - to and from the west were assigned to the Mary Hill Access
    - to and from the east were assigned to the Kelly Ave access
  - Kingsway access: assigned to Kelly Ave Access
  - Kelly Ave west access: assigned to Mary Hill Access
  - Kelly Ave east access: assigned to Kelly Ave Access
  - Through traffic on Kelly Ave was reassigned to Hawthorne and Tyner.
  - Trips approaching the intersection of Wilson Ave at Mary Hill Rd were distributed 50/50 to and from the north and to and from the west.
  - Trips approaching the intersection of Wilson Ave at Kingsway to and from the south were distributed to and from the north only.

The reassigned percentage distribution for the site trips was used for the assignment of future site trips for the Recreation Complex. This is shown in **Figure 8**.

#### **Residential – Condos:**

The new distribution was calculated with the following assumptions:

- The trips were split 50/50 between the east and west access off Kelly Ave.
- Trips to and from the south are mainly work oriented trips.
- Trips to and from the north are mainly leisure, entertainment, shopping oriented.
- The majority of the trips will be to and from the south.
- Inbound trips: from the south - 70%; from the north – 30%.
- Outbound trips: to the south - 30%; to the north – 70%.

#### **Residential – Seniors:**

The new distribution was calculated with the following assumptions:

- There is only one access which is the west access off Kelly Ave.
- Trips to and from the south are mainly work oriented trips.
- Trips to and from the north are mainly leisure, entertainment, shopping oriented.
- The majority of the trips will be to and from the north.

- Inbound trips: from the south - 30%; from the north – 70%.
- Outbound trips: to the south - 30%; to the north – 70%.

**Residential – Apartment (Rental):**

The new distribution was calculated with the following assumptions:

- There is only one access which is the west access off Kelly Ave.
- Trips to and from the south are mainly work oriented trips.
- Trips to and from the north are mainly leisure, entertainment, shopping oriented.
- The majority of the trips will be to and from the south.
- Inbound trips: from the south - 70%; from the north – 30%.
- Outbound trips: to the south - 30%; to the north – 70%.

The percentage distribution for the residential site trips is shown in **Figure 9**. Error! Reference source not found.

**4.6. Total Site Traffic**

The total site traffic includes the new Complex traffic together with the Residential (Condos and Seniors) and is shown in **Figure 10**.

The west access at Mary Hill Road has a high percentage of the trips approaching and departing the Complex. The underground parking lot connects to both accesses and it is likely that traffic will redistribute with time, based on the time of the day, programming of the Complex and the operation of the access points.

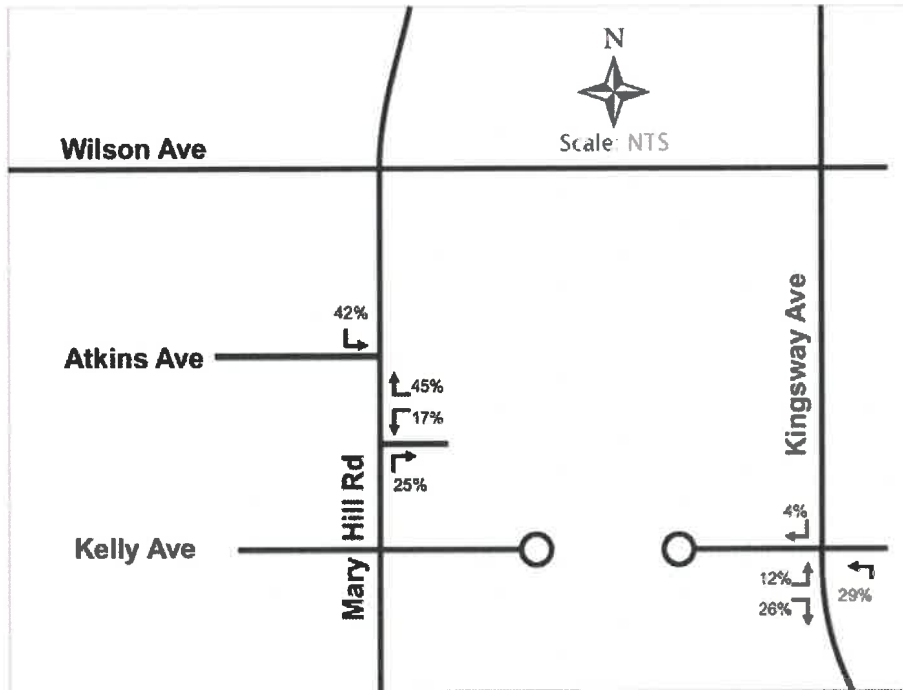


Figure 8: Future Residential Development – PM Trip Distribution Percentages

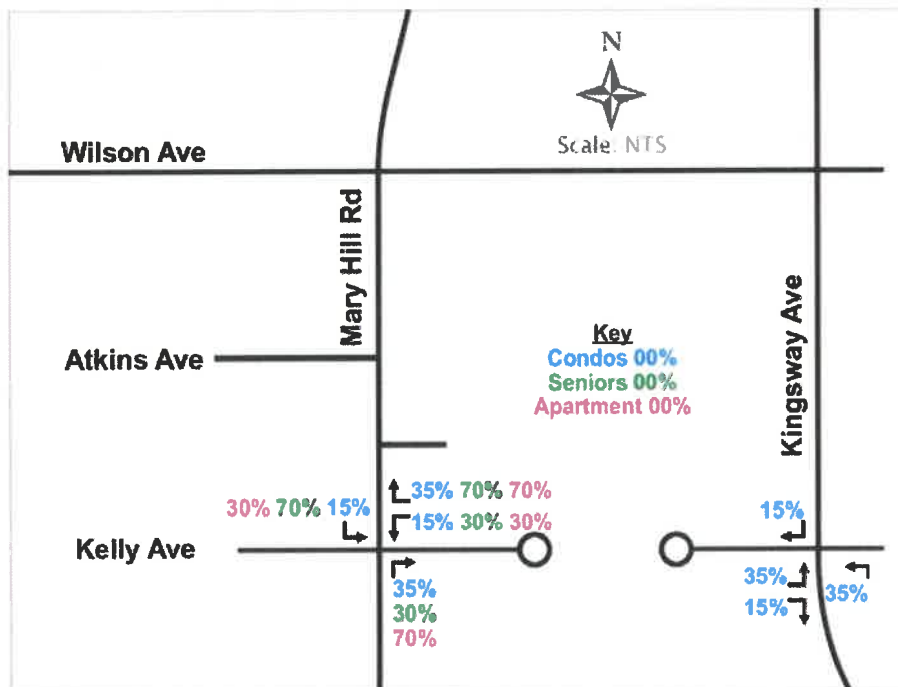


Figure 9: Future Residential Development – PM Trip Distribution Percentages

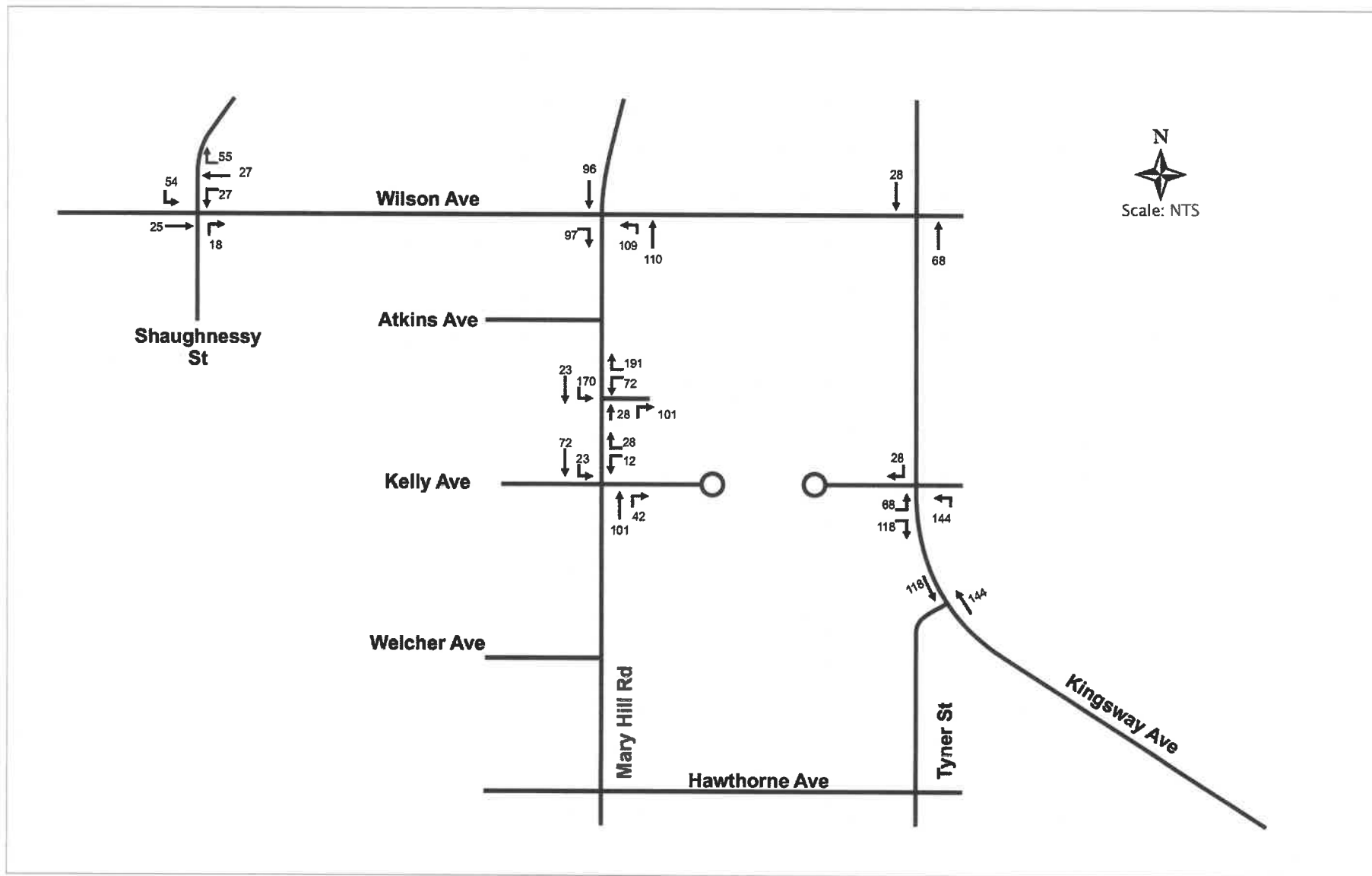


Figure 10  
Future Development Total PM Site Traffic

## 5. Future Background Traffic

### 5.1. Future PM 2021 Background Trips

The future background traffic was developed using the existing PM trips and removing the trips related to the existing Complex. Some of the background trips were also reassigned based on the new network with Kelly Ave being closed. The through trips on Kelly were reassigned via Hawthorne to Tyner St.

This new existing background base was then increased by the background growth rate of 1.5% per year over 5 years.

The resulting 2021 PM background trips is shown in **Figure 11**.

### 5.2. Future PM 2021 Background Analysis

The Future PM 2021 background traffic volumes were analyzed based on the existing laning configuration and signal timings with the new network. Only key intersections were analyzed for reference. The results are shown in **Table 7**.

The results show that the network operates reasonably well but the issues observed in the existing scenario continue even without the Complex traffic. There are also some improvements in operation based on the removal of the Complex traffic.

Intersections that have operational deficiencies that need to be mitigated or monitored are listed below:

- **Wilson Ave/Kingsway Ave:**
  - The SB movement has a long queue build of 126m. This needs to be monitored with redevelopment.
- **Kelly Ave/Kingsway Ave:**
  - The WB LT movement fails with associated queue build up. This is due to the lack of gaps on Kingsway for this movement.
- **Tyner St/Kingsway Ave:**
  - The EB LT also fails with a ~ 50m 95 percentile queue. This is due to the high through movements at this location on Kingsway and the lack of gaps to make the turn.

This analysis shows that many of the operational issues will occur with time even if the traffic demand related to the Complex is removed.

**Table 7: 2021 Future PM Background Analysis**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Wilson Ave/Mary Hill Rd	EB LTR	B	37
	WB LTR	C	62
	NB LTR	B	59
	SB LTR	B	75
	Overall	B	
Wilson Ave/Kingsway Ave	EB LT	C	22
	EB R	B	17
	WB LTR	D	33
	NB L	B	41
	NB TR	A	66
	SB L	B	5
	SB TR	C	126
	Overall	B	
Kingsway Ave/Kelly Ave	EB LTR		
	WB L	F	47
	NB LTR		
	SB LTR	A	2
	Overall		
Kingsway Ave/Tyner St <sup>5</sup>	EB L	F	42
	EB R	C	8
	NB L	B	4
	Overall		

<sup>5</sup> Laning allowed for NB left turn pocket lane and EB left turn pocket lane



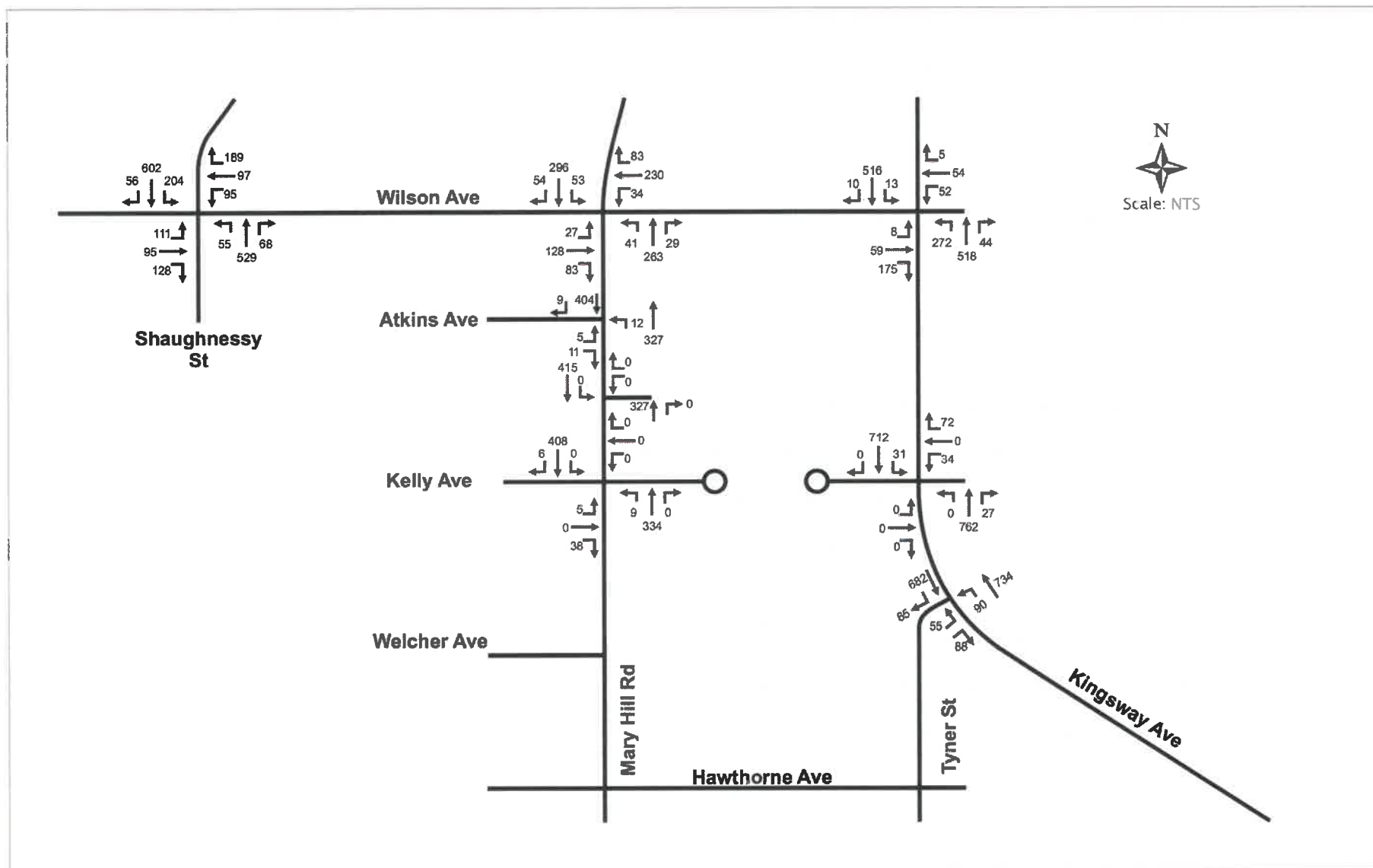


Figure 11  
Future 2021 PM Background Traffic

## 6. Future Total Traffic

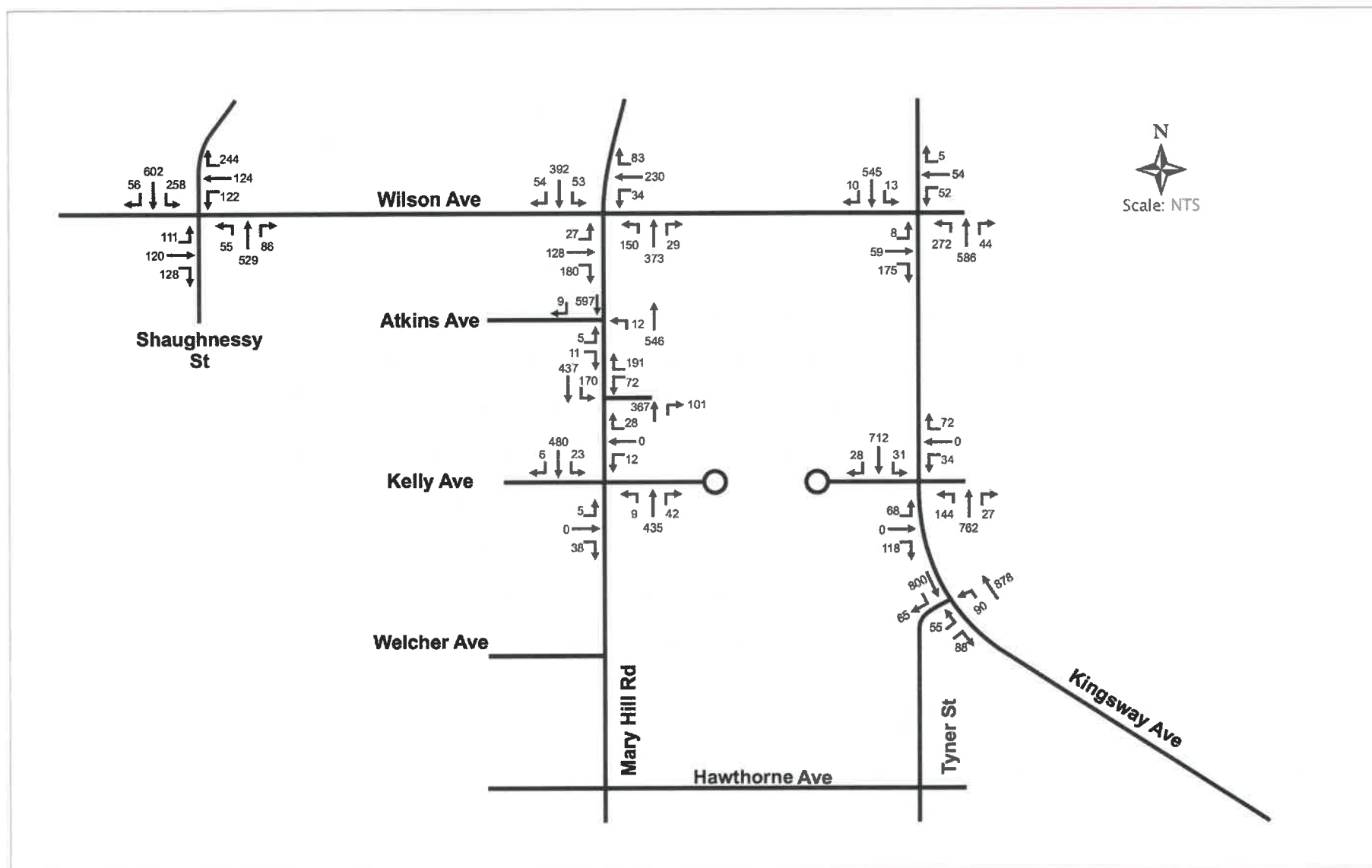
### 6.1. Future PM 2021 Total Traffic – no improvements

The 2021 Future Total PM traffic was developed by adding the Total Site PM traffic to the 2021 Background PM traffic. This is shown in **Figure 12**.

Analysis was undertaken using the future volumes, the existing signal timing and the existing laning. The results are tabulated below in **Table 8**.

The discussion of the analysis and possible mitigation measures follows:

- **Wilson Ave/Mary Hill Rd:**
  - There are long queue build-ups for north and southbound. This could be mitigated with a signal timing adjustment as well as adding left turn pocket lanes. In addition, east and westbound short right turn lanes could provide some additional capacity to the north-south signal movement.
- **Wilson Ave/Kingsway Ave:**
  - The SB movement queue continues to grow with time. A signal timing adjustment to the east-west movement could add capacity north-south.
- **Kelly Ave/Kingsway Ave:**
  - This intersection fails with high delays and long queues for both the east and west movements.
  - As this is one of the main access to the Complex as well as a future link to the multi-use trail east of Kingsway Ave, signalization is recommended.
- **Kelly Ave/ Mary Hill Road:**
  - This intersection operates well.
  - There is some delay for the westbound movements but these volumes are low. There is less westbound traffic approaching this intersection than in the existing scenario.
- **Mary Hill Rd/West Access:**
  - The WB LT fails at this location.
  - This is the result of the high movements at this location.
  - Users of the centre, with time, will distribute their access based on time of day, delays at accesses and programming.
  - It is proposed that this intersection is monitored and possible future signalization may be necessary.
- **Tyner St/Kingsway Ave:**
  - The EB LT also fails with a long 95 percentile queue. This is due to the high through movements at this location on Kingsway and the lack of gaps to make the turn.
  - Signalization at Kelly Ave and Kingsway Ave will provide some gaps in traffic flow on Kingsway Ave.
  - A review of the intersection layout may provide some ability to access Kingsway with less delay.
- **Wilson Ave/Shaghnessy St:**
  - The NB through movement continues to have a queue build up. This could be mitigated with a signal timing adjustment and needs to be monitored.



**Figure 12**  
**Future 2021 PM Total Traffic**

**Table 8: 2021 Future PM Peak Hour Analysis – no improvements**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Wilson Ave/Mary Hill Rd	EB LTR	B	50
	WB LTR	C	61
	NB LTR	D	159
	SB LTR	C	120
	Overall	C	
Wilson Ave/Kingsway Ave	EB LT	C	22
	EB R	B	18
	WB LTR	D	34
	NB L	B	42
	NB TR	A	73
	SB L	B	5
	SB TR	C	140
	Overall	B	
Kingsway Ave/Kelly Ave	EB LTR	F	Err
	WB L	F	Err
	NB LTR	A	7
	SB LTR	A	2
	Overall		
Kelly Ave/Mary Hill Rd	EB LTR	C	5
	WB LTR	D	8
	NB LTR	A	1
	SB LTR	A	1
	Overall		
Mary Hill Rd/West Access	EB L	F	27
	EB R	B	13
	NB TR		
	SB LT	A	6
	Overall		
Kingsway Ave/Tyner St <sup>6</sup>	EB L	F	64
	EB R	C	12
	NB L	B	5
	Overall		
Wilson Ave/Shaghnessy St	EB L	D	35
	EB T	C	34
	EB R	A	15
	WB L	D	38
	WB T	C	35
	WB R	B	22
	NB L	B	17
	NB T	C	161
	NB R	A	9
	SB L	B	46
	SB T	B	114
	SB R	A	7
	Overall	C	

<sup>6</sup> Laning allowed for NB left turn pocket lane and EB left turn pocket lane

## 6.2. Future Planning in Port Coquitlam

The 2013 Master Transportation Plan identified a few items in the study area that were included in the review. The Plan identified the following:

- *Kingsway Avenue: Wilson to Broadway Ave Mixed Use Trail:* This trail is planned for the east side of Kingsway within the BC Hydro right of way.
- *Downtown to Westwood St Bicycle Route:* This route is planned to connect along Kelly Ave and would be an east-west connection to the Kingsway trail in the east.
- *Signal at Tyner St/Kingsway Ave:* This has been identified for future signalization on Map 10 of the report. However the description refers to the CMBC access which is further east of Tyner.

## 6.3. Trips reduction through use of alternative modes and TDM

The analysis undertaken in this report does not take into account trip reduction factors due to use of alternative modes or terrific demand management (TDM). This analysis is conservative and trip reduction factors can be applied with input from the City.

## 6.4. Future PM 2021 Total Traffic – with improvements

Improvements were made to the future network to assist with mitigating some of the problems identified. Based on this review and the analysis results, the following improvements were added and the resulting operations were analyzed:

- *Wilson Ave/Mary Hill Rd:*
  - EB – added EB RT lane – 20m
  - WB – added WB RT lane – 10m
  - NB – added LT bay – 25m
  - SB – added LT bay – 20m
  - Some parking may need to be removed to allow for turn bays.
  - No road widening is required – only signs and markings.
- *Wilson Ave/Kingsway Ave:*
  - WB – added WB LT lane – 15m
  - No road widening is required – only signs and markings.
- *Kelly Ave/Kingsway Ave:*
  - New signal with pedestrian crossings on west, north and east legs
  - EB – added EB LT lane – 40m
  - WB – adjusted laning to WB LT and shared WB Th+R
  - NB – added LT bay – 40m
  - SB – added LT bay – 40m
  - No road widening is required – only signs and markings.
- *Tyner St/Kingsway Ave:*
  - Added a centre median island on Kingsway Ave which allows for left turn movements out of Tyner Street to take place into a refuge area before merging into northbound traffic.
  - Wider radius added for south leg to allow for a separate left and right turn lane on Tyner St.
  - Some civil works are required but no property impact is envisaged.

The concept layout for Kingsway is shown in **Figure 13**. The majority of the changes suggested can be accommodated within the existing road pavement. The signal improvement will need to include accommodation for cycle and pedestrian traffic accessing the trail on the east side of Kingsway Ave. The work at Tyner St will require some civil work to improve the geometry and add some width. This concept is for illustration purposes only and further design review is required to confirm feasibility.

The suggestions for improvements and conceptual layouts, as noted in this section, need to be confirmed in the field and additional review and design is required to confirm the geometry, impact on utilities, impact on landscaping, impact on the current road network, etc.

The resultant analysis is shown in **Table 9**. This table also shows that the individual movements satisfy the target of LOS D or better.

The discussion of the analysis follows:

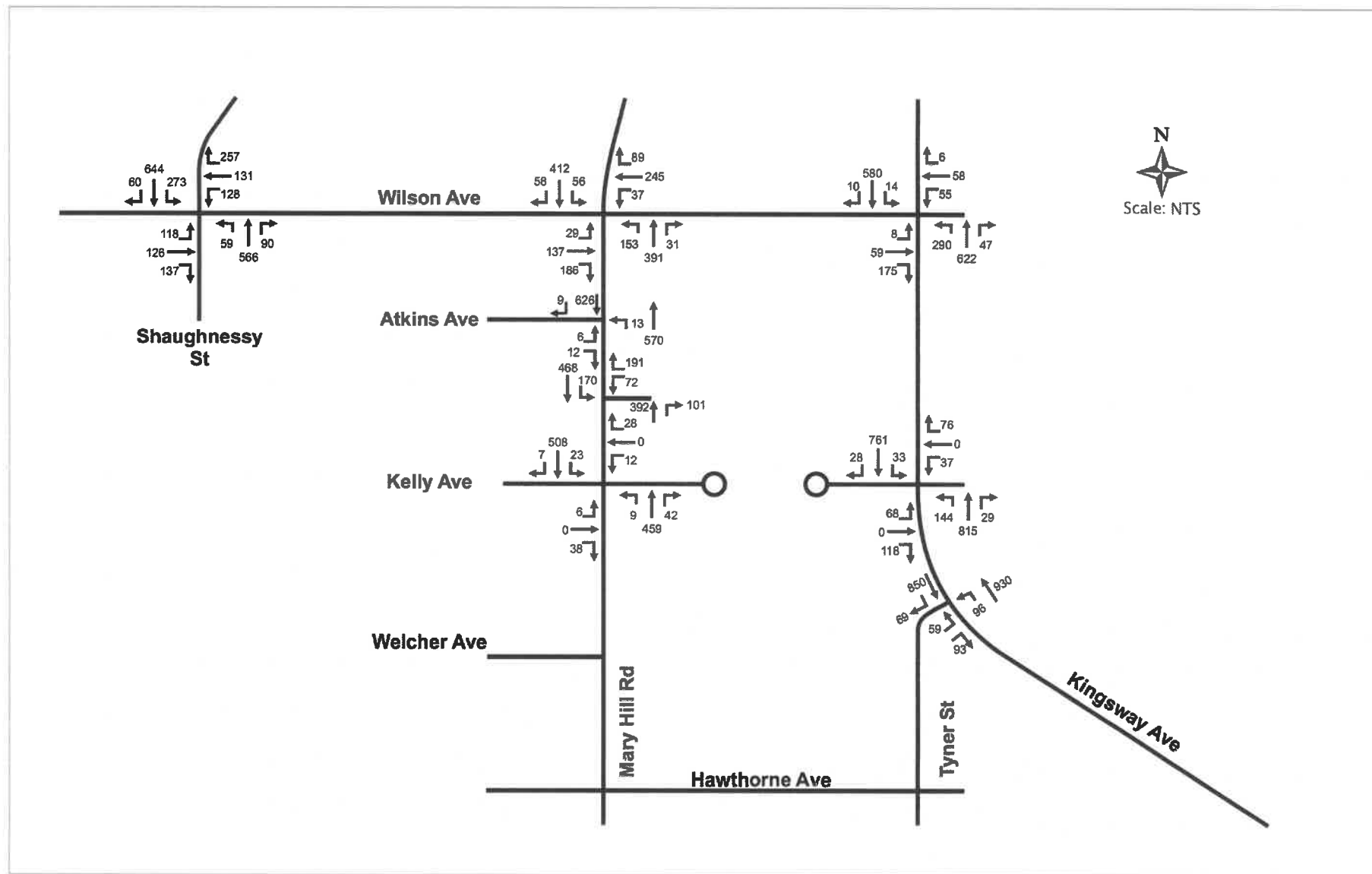
- **Wilson Ave/Mary Hill Rd:**
  - The additional turn lanes reduced the queues significantly for the north-south movements.
- **Wilson Ave/Kingsway Ave:**
  - The addition of the WB LT pocket lane and adjustment to the signal timing reduced the SB queue slightly.
  - This intersection will need to be monitored.
- **Kelly Ave/Kingsway Ave:**
  - The signalization improves the operation with all movements at a LOS C or better.
  - The additional turn lanes are needed to provide this additional capacity at the intersection.
- **Kelly Ave/ Mary Hill Road:**
  - This intersection operates well.
  - There is some delay for the westbound movements but these volumes are low.
- **Mary Hill Rd/West Access:**
  - The WB LT fails at this location which is a result of the high movements at this location.
  - Users of the centre, with time, will distribute their access based on time of day, delays at accesses and programming.
  - It is proposed that this intersection is monitored and possible future signalization may be necessary.
- **Tyner St/Kingsway Ave:**
  - The installation of the signal at Kelly and Kingsway allows for slightly better operation.
  - The overall LOS of the intersection improves from a LOS F to D with the conceptual layout geometry. The EB LT is still delayed with LOS E but the queue is significantly shorter.
- **Wilson Ave/Shaghnessy St:**
  - All movements operate at LOS D or better.
  - The NB through movement continues to have a queue build up. This could be mitigated with a signal timing adjustment and needs to be monitored.
  - The SB L movement has a queue length that exceeds the bay length. This could be mitigated with a signal timing adjustment and needs to be monitored.

**Table 9: 2021 Future PM Peak Hour Analysis – with improvements**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Wilson Ave/Mary Hill Rd	EB LT	B	27
	EB R	A	12
	WB LT	C	45
	WB R	A	10
	NB L	B	28
	NB TR	B	51
	SB L	A	9
	SB TR	B	59
	Overall	B	
Wilson Ave/Kingsway Ave	EB LT	D	24
	EB R	B	19
	WB L	D	20
	WB RT	C	21
	NB L	B	29
	NB TR	A	67
	SB L	B	5
	SB TR	C	131
	Overall	B	
Kingsway Ave/Kelly Ave	EB L	C	18
	EB TR	A	6
	WB L	C	11
	WB TR	A	1
	NB L	B	30
	NB TR	B	145
	SB L	A	5
	SB TR	A	102
	Overall	B	
Kelly Ave/Mary Hill Rd	EB LTR	B	3
	WB LTR	C	4
	NB LTR	A	1
	SB LTR	A	1
	Overall		
Mary Hill Rd/West Access	EB L	F	26
	EB R	B	13
	NB TR		
	SB LT	A	6
	Overall		
Kingsway Ave/Tyner St <sup>7</sup>	EB L	E	15
	EB R	C	12
	NB L	B	5
	Overall		
Wilson Ave/Shaghnessy St	EB L	D	35
	EB T	C	34
	EB R	A	15
	WB L	D	38
	WB T	C	35
	WB R	B	22
	NB L	B	17
	NB T	C	155
	NB R	A	8
	SB L	B	48
	SB T	B	114
	SB R	A	7
	Overall	C	

<sup>7</sup> Laning allowed for NB left turn pocket lane and EB left turn pocket lane; NB through traffic excluded





**Figure 13**  
**Future 2026 PM Total Traffic**

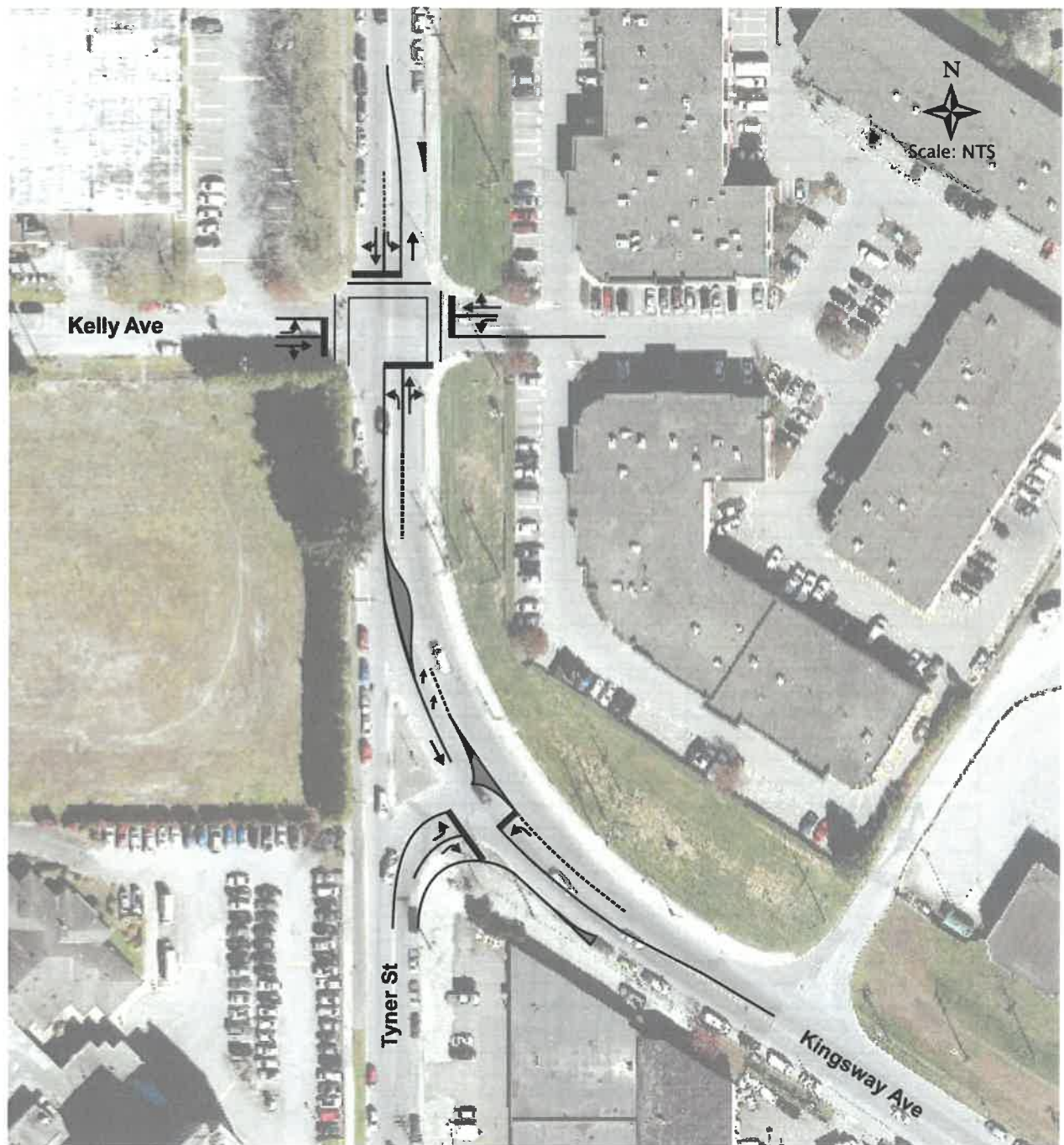
## 6.5. Future PM 2026 Total Traffic – with improvements

The 2026 Future Total PM traffic was developed by adding the Total Site PM traffic to the 2026 Background PM traffic. This is shown in **Figure 14**.

Analysis was undertaken using the future volumes and the future network improvements as noted previously. The results are tabulated below in **Table 10**.

The operation of the network in 2026 is slightly worse than in 2021 but the majority of the movements LOS are D or better. The discussion of the analysis follows:

- **Wilson Ave/Mary Hill Rd:**
  - The intersection continues to operate effectively. Monitoring of the queues is recommended. Some on-street parking may need to be removed in the future
- **Wilson Ave/Kingsway Ave:**
  - The SB movement queue continues to grow with time. A signal timing adjustment to the east-west movement could add capacity north-south.
  - The NB left turn queue extends close to the storage length of the bay. This bay may need to be extended so that left turning traffic does not impede through traffic.
- **Kelly Ave/Kingsway Ave:**
  - This intersection continues to operate well.
  - The north-south queues do build with time. The queues need to be monitored so they do not affect the upstream and downstream intersection operations.
- **Kelly Ave/ Mary Hill Road:**
  - This intersection operates similar to the 2021 scenario.
  - There is some delay for the westbound movements but these volumes are low.
- **Mary Hill Rd/West Access:**
  - The WB LT fails at this location. This is the result of the high movements at this location.
  - Users of the centre, with time, will distribute their access based on time of day, delays at accesses and programming.
  - It is proposed that this intersection is monitored and possible future signalization may be necessary.
- **Tyner St/Kingsway Ave:**
  - The installation of the signal at Kelly and Kingsway allows for slightly better operation.
  - The overall LOS of the intersection is about the same as in 2021.
- **Wilson Ave/Shaghnessy St:**
  - All movements operate at LOS D or better.
  - The NB through movement continues to have a queue build up. This could be mitigated with a signal timing adjustment and needs to be monitored.
  - The SB L movement has a queue length that exceeds the bay length. This could be mitigated with a signal timing adjustment and needs to be monitored.



**Figure 13**  
**Concept Layout Kingsway**

**Table 10: 2026 Future PM Peak Hour Analysis – with improvements**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Wilson Ave/Mary Hill Rd	EB LT	B	29
	EB R	A	12
	WB LT	C	49
	WB R	A	11
	NB L	B	30
	NB TR	B	55
	SB L	A	10
	SB TR	B	63
	Overall	B	
Wilson Ave/Kingsway Ave	EB LT	D	24
	EB R	B	19
	WB L	D	21
	WB RT	C	22
	NB L	B	42
	NB TR	A	75
	SB L	B	6
	SB TR	C	158
	Overall	B	
Kingsway Ave/Kelly Ave	EB L	C	18
	EB TR	A	8
	WB L	C	11
	WB TR	A	3
	NB L	B	39
	NB TR	B	163
	SB L	A	6
	SB TR	B	146
	Overall	B	
Kelly Ave/Mary Hill Rd	EB LTR	C	6
	WB LTR	D	9
	NB LTR	A	1
	SB LTR	A	1
	Overall		
Mary Hill Rd/West Access	EB L	F	30
	EB R	B	14
	NB TR		
	SB LT	A	6
	Overall	E	
Kingsway Ave/Tyner St <sup>8</sup>	EB L	E	14
	EB R	C	11
	NB L	B	5
	Overall	D	
Wilson Ave/Shaghnessy St	EB L	D	37
	EB T	C	36
	EB R	A	16
	WB L	D	40
	WB T	C	37
	WB R	B	26
	NB L	B	18
	NB T	D	175
	NB R	A	9
	SB L	C	72
	SB T	B	129
	SB R	A	8
	Overall	C	

<sup>8</sup> Laning allowed for NB left turn pocket lane and EB left turn pocket lane; NB through traffic excluded



## 6.6. Future Traffic Control – Signalization vs Roundabouts

The City requested a review of the possibility of roundabouts for the future traffic control for the intersections of Kelly Ave at Kingsway and Tyner St at Kingsway. A conceptual layout was developed using TORUS software<sup>9</sup>. This software allows for conceptual layouts of geometry on base plans. The current road right of way together with the BC Hydro utility corridor indicates that there is space to accommodate the roundabouts. The layout is shown in Figure 15.

An inscribed circle diameter of ~28m was used for both roundabouts. This can accommodate movements for trucks and buses.



**Figure 15: Roundabout layout at Kelly Ave and Tyner St at Kingsway**

Analysis was undertaken using the future volumes for the 2021 and 2026 PM scenarios. The previous improvements suggested were included with the roundabouts at the two intersections. The software Sidra was used for this analysis. The results are tabulated below in Table 11 and Table 12. The intersections operate well with the roundabout configuration. The southbound queue will also extend but should not interfere with the operation of Wilson/Kingsway. The north-south queues at Kelly / Kingsway are significantly less than the queues for the signal option. However, it should be noted that the northbound queue at Kelly/Kingsway does extend for 83m. The two roundabouts are about 95m apart so this queue would need to be monitored.

<sup>9</sup> TORUS software is developed by TranSoft Solutions for conceptual roundabout design  
<http://www.transoftsolutions.com/road-design/torus-roundabouts/>

**Table 11: 2021 Future PM Peak Hour Analysis – with roundabouts**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Kingsway Ave/Kelly Ave	EB	B	23
	WB	C	17
	NB	A	83
	SB	A	63
	Overall	A	
Kingsway Ave/Tyner St	EB	B	16
	NB	A	92
	SB	A	70
	Overall	A	

**Table 12: 2026 Future PM Peak Hour Analysis – with roundabouts**

Intersection	Movement	PM Pk Hr	
		LOS	95% Q
Kingsway Ave/Kelly Ave	EB	B	23
	WB	C	28
	NB	A	97
	SB	A	80
	Overall	A	
Kingsway Ave/Tyner St	EB	B	21
	NB	A	110
	SB	A	84
	Overall	A	

A comparison of the pros and cons of a traffic signal and that of a roundabout is listed in **Table 13** and **Table 14**.

**Table 13: Traffic Signals – Pros and Cons**

Criteria	Traffic Signal	
	<b>PROS</b>	<b>CONS</b>
Delay		Need to provide min green times – time intervals created where no vehicles are entering the intersection.
Timing	Timing can be programmed to allow access for minor streets.	Need time of day timing plans to meet demands.
Space	Needs less ROW at intersection	Need more ROW for left turn lanes and storage
Safety		Higher crash rate. Higher cost and higher risk crash statistics
Pedestrians	Clearer crossing right of way	
Cyclists	Can determine crossing areas with bicycle boxes and bicycle lanes.	
Sustainability		Higher emissions, higher vehicle wear and tear, higher noise.
Cost	Lower land costs.	Higher construction costs and higher maintenance costs.

**Table 14: Roundabouts – Pros and Cons**

Criteria	Roundabout	
	<b>PROS</b>	<b>CONS</b>
Delay	Traffic can keep moving. Less delay overall as vehicles can enter the intersection if there is a gap.	
Timing	Can accommodate a wide range of vehicle approach volumes.	Does not operate well with imbalanced traffic flow.
Space	Needs less ROW for laning	Need for more ROW at intersection
Safety	Crash rate is lower. Lower cost and lower risk crash statistics. Reduced chance of head-on collisions.	
Pedestrians		Can be confusing and crosswalks need to be set well back from entrance to rbt.
Cyclists		Can be confusing – need to differentiate cycle path and crossings.
Sustainability	Less braking therefore lower emissions, lower wear and tear and lower noise	
Design	Can include an entrance feature	
Cost	Construction costs lower. Lower long term costs and maintenance lower	Land cost higher.

The benefits of a roundabout include the following:

- Improved safety: roundabouts are safer than traditional signal-controlled intersections; less collisions, lower severity.
- Low travel speed: act as a traffic calming device; no light to beat
- Reduce delay, improve traffic flow: up to 20% reduction compared to traffic signal
- Less expensive: over lifetime plus not affected by power outages
- Aesthetics: landscaped central island.

The conceptual layouts, as noted in this section, need to be confirmed in the field and additional review and design is required to confirm the geometry, impact on utilities, impact on landscaping, impact on the current road network, etc.

## 7. Summary and Conclusions

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1. The current network operates reasonably well but there are delays associated with left turn access onto Kingsway Avenue at Kelly Ave and Tyner St.
2. The PM Peak hour is the street network peak as well as the Complex peak operating condition.
3. The existing Complex generates a total of 395 trips in the PM peak (inbound and outbound).
4. The new Complex is estimated to generate a total of 829 trips in the PM Peak (inbound and outbound).
5. The proposed residential development is estimated to generate a total of 168 trips in the PM Peak (inbound and outbound).
6. Total trips for the new development is estimated at 997 trips in the PM Peak (inbound and outbound).
7. The new development road network includes the closure of Kelly Ave as a through road. Access to the Complex will be through a new west access off Mary Hill Rd and to the east through Kelly Ave at Kingsway.
8. The west access at Mary Hill Road has a high percentage of the trips approaching and departing the Complex. It is likely that traffic will redistribute with time, based on the time of the day, programming of the Complex and the operation of the access points.
9. The future background traffic was developed for 2021 without the Complex and the results show that the network operates reasonably well. Issues related to operation along Kingsway in the existing scenario continue even without the Complex traffic.
10. The analysis of the total traffic for 2021 in the PM peak assigned to the existing network indicated that a signal is required at Kelly Ave/Kingsway Ave and that Tyner St/Kingsway Ave needs modifications to improve operations. A conceptual layout has been developed for further design review. The signal improvement will need to include accommodation for cycle and pedestrian traffic accessing the future trail on the east side of Kingsway Ave.
11. Other improvements include:
  - Added turn lanes at Wilson Ave/Mary Hill Rd: EB and WB RT bays; NB and SB LT bays.
  - Added westbound LT lane at Wilson Ave/Kingsway Ave
12. The majority of the off-site improvements can be accommodated within the current pavement width.
13. The analysis of the total traffic for 2021 PM peak with the improvements indicates that the network is operating at LOS D or better in the majority of the key traffic movements. The west access from the Complex is showing delays for the westbound left turn. It is assumed that some of the traffic will redistribute to Kelly Ave which will be a signalized intersection.
14. The 2026 PM peak analysis with the improvements shows that the network will continue to operate well after Opening Day.
15. A conceptual review of the option for roundabouts at the intersections of Kelly Ave and Tyner St with Kingsway shows that there is sufficient space to accommodate all movements.
16. The roundabout analysis shows that the operation operates well in the 2021 and 2026 PM peak traffic conditions.



**APPENDIX A**  
**TRAFFIC COUNT DATA**  
**(Provided separately as an electronic file)**

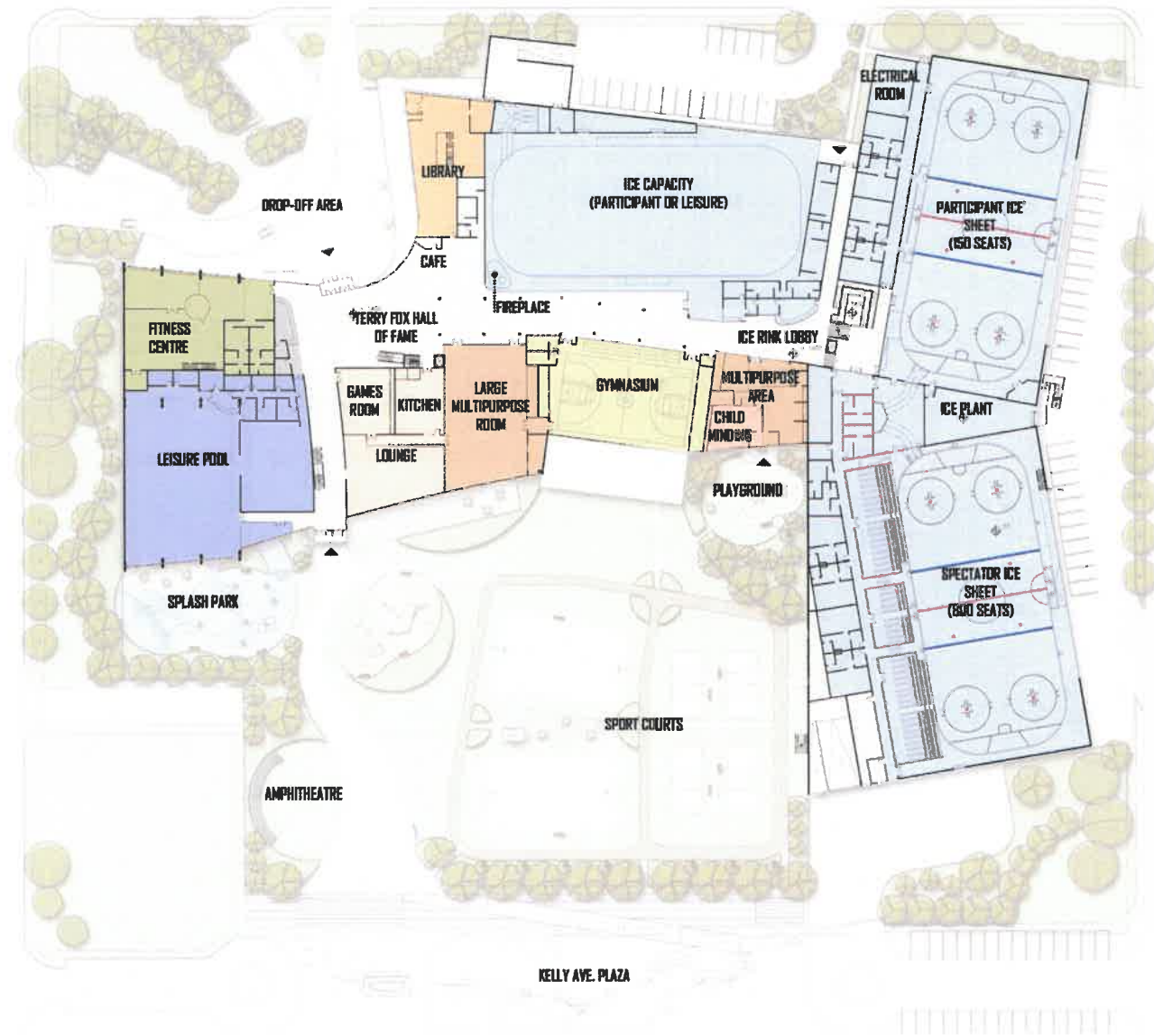
**APPENDIX B**  
**SYNCHRO RESULTS**  
**(Provided separately as an electronic file)**

## **APPENDIX C**

### **NEW DEVELOPMENT SITE PLANS**

## GROUND FLOOR PLAN

NOTE: FLOOR PLANS ARE SUBJECT TO A DETAILED DESIGN REVIEW AND CITY APPROVAL. FINAL CONSTRUCTION DRAWINGS MAY DIFFER.





## SECOND FLOOR PLAN

