

## APPENDIX 23d

**From:** Piche, Ardell MOTI:EX  
**Sent:** Monday, October 23, 2023 7:19 AM  
**To:** Nicole Olenick  
**Cc:** Jim Bailey; Jenn Moller; Allwood, Angie MOTI:EX  
**Subject:** Cypress Village TIA Addendum - for review

Good morning Nicole,

Thank you for submitting the Addendum materials for the Cypress Village TIA. James Lee, MoTI Traffic Eng., has reviewed the material and commented that the overall change is not significant enough to cause any concern. We have no further comments/questions on the revised TIA.

Thank you,

**Ardell Piche** | Senior Development Officer  
Ministry of Transportation & Infrastructure  
BC Housing Action Task Force

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October 2023

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# Traffic Impact Assessment Cypress Village Development

British Pacific Properties, West Vancouver, BC

## ADDENDUM 1 - FINAL REPORT: Rev 2

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Howes Technical Advantage Ltd.

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## 1. Introduction

British Pacific Properties Ltd. (BPP) is planning to develop “Cypress Village” on approximately 350-acre planning area in the Upper Lands Area in West Vancouver, BC. Cypress Village is included in the District of West Vancouver’s (DWV) updated Official Community Plan (OCP) adopted in 2018.

Cypress Village falls within the area called the Upper Lands within the OCP, adjacent to a neighbourhood called Rodgers Creek, for which an Area Development Plan (ADP) and zoning bylaw exist. The proposed development site is located adjacent to Cypress Bowl Road, north of Highway 1.

A Traffic Impact Assessment (TIA) was completed in April 2022 and was submitted to and was approved by the District of West Vancouver and the BC Ministry of Transportation and Infrastructure (MoTI).

This Addendum represents additional analysis associated with an increase in residential area for Cypress Village as well as an increase in the work from home (WFH) percentage assumption. Only sections of the report that have changed, and are relevant to the changes made, have been included in this Addendum. Where a section has been changed, this is noted as “Updated” and where the section is repeated for continuity, this is noted as “As in the TIA”. As such the sections on background information, existing conditions, and background traffic growth, and the associated analysis, are not included in this report.

Howes Technical Advantage Ltd. (HTA) was retained by BPP to prepare the TIA and this associated Addendum 1. HTA is supported by a team of specialist consultants for transportation modelling and analysis (McElhanney Ltd.), for alternative mode assessment and quality control (Richard Drdul, P.Eng.), and for transit assessment (Dennis Fletcher).

### 1.1. Proposed Development - Updated

The TIA for Cypress Village included 3,586 residential dwelling units, 100,000 ft<sup>2</sup> of assisted living (125 units), 130,000 ft<sup>2</sup> of commercial space, 130,000 ft<sup>2</sup> of light industrial/commercial uses, a 120 room hotel, and 85,300 ft<sup>2</sup> of other uses including an elementary school, daycare facilities, community centre and a fire hall.

This Addendum includes two changes:

- An additional 300,000 ft<sup>2</sup> of residential space:
  - Most of this additional space (220,500 ft<sup>2</sup>) is allocated to making units larger but not changing the number of bedrooms, so there are no resulting changes to the traffic analysis.
  - A portion of this additional space (79,500 ft<sup>2</sup>) is allocated to adding bedrooms within some of the multi-family high-rise units, which results in a higher assumed overall average persons per unit (ppu) for the multi-family high-rise category.
- An adjustment in the number of units between multi-family mid-rise, multi-family high-rise, and assisted living units.

The number of residential units has remained the same and is shown in **Table 1**.

**Table 1: Land Use Changes to Residential Units (changes shown in bold)**

Cypress Village	TIA	TIA Addendum	Commentary
Unit Type	No. of Units	No. of Units	
Single Family	230	230	No change
Multi-family Low-Rise	161	161	No change
Multi-family Mid-Rise	1,171	<b>946</b>	Reduction in units (-225)
Multi-family High-Rise	2,024	<b>2,149</b>	Additional units (+125)
Assisted Living	125 (100,000 ft <sup>2</sup> )	<b>225 (225,000 ft<sup>2</sup>)</b>	Additional units (+100, +125,000 ft <sup>2</sup> )
<b>Total Residential Units</b>	<b>3,711</b>	<b>3,711</b>	Remains the same

### 1.2. Proposed Off-Site Improvements - *as in TIA*

As noted in the TIA, the development includes several transportation infrastructure improvements which are proposed to be included in the future network. These include:

- A new two lane road called Westmount Connector which will connect Cypress Bowl Road to the Westmount Highway 1 interchange with a signalized intersection at the westbound off-ramp of the interchange.
- Conversion of the existing intersection on Cypress Bowl Road at the DWV Operations Centre into a new 5 legged roundabout connecting Village Street and Westmount Connector.
- A new roundabout at the intersection of Cypress Bowl Road and a realigned Eagle Lake Road.
- A full traffic signal at the Cypress Lane intersection on Cypress Bowl Road.
- Upgrades to Cypress Bowl Road from Cypress Lane to the Highway 1 interchange.
- Upgrade the Westmount Road/Westridge Road intersection to a full traffic signal.

### 1.3. Study Intersections - *as in TIA*

As noted in the TIA, the key intersections within the study area include:

#### Existing intersections:

- Cypress Bowl Road/Highway 1 westbound off ramp
- Westmount Road/Westridge Ave
- Cypress Bowl Road/Cypress Lane
- Cypress Bowl Road/Uplands Rd (part of Rodgers Creek - under construction)
- Cypress Bowl Road / Chippendale Road

#### Proposed new intersections:

- Cypress Bowl Road/Village Street South/Westmount Connector (reconfiguration of Eagle Lake Access Rd and realignment of Operations Centre Access)
- Cypress Bowl Road/Eagle Lake Road
- Westmount Connector/Highway 1 westbound off ramp

The proposed future road network and laning is shown in **Figure 1**. (This is the same as **Figure 8** in the TIA).

## 2. Assumptions - *Updated*

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The following assumptions were made for this report:

- The development layout details were provided by UDA Consultants.
- The preliminary road design details were provided by Urban Systems Ltd.
- Assumptions for build out were supplied by BPP.
- Assumptions for future persons per units (ppu) were supplied by BPP and confirmed by the DWV.



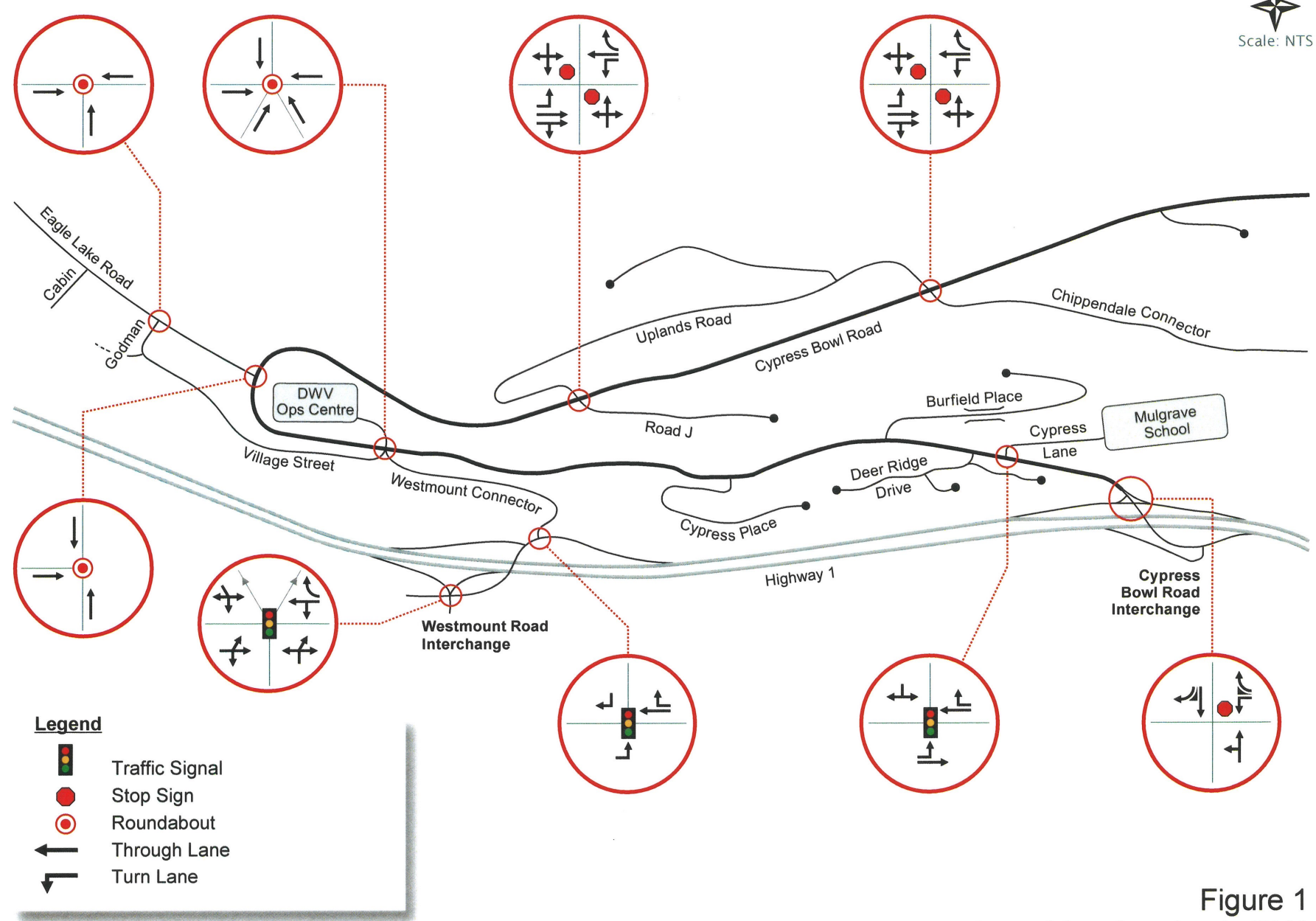


Figure 1  
Proposed Future Network and Laning (as in TIA)

### 3. Project Traffic - Updated

This section describes the changes to the planned land uses for Cypress Village and the associated trip generation compared to the TIA.

#### 3.1. Land Use Adjustments and Location - Updated

The first step in estimating the trip generation for the TIA Addendum scenario was to determine how to apply the land use changes to the various pods within the Village. It was assumed that the changes to the Multi-Family Mid-Rise and Multi-Family High-Rise land uses would occur within the Village Core Area only.

Land uses associated with the proposed development are summarized in **Table 2** separated into the areas of core, non-core, and Uplands.

**Table 2: Cypress Village Proposed Land Uses - Updated (Changes since TIA in Bold)**

Land Use Description	Residential					Retail			Office			Light Industrial	Hotel	Comm. Centre	Fire Hall	Education	
	Multi-Family			Single-Family	Assisted Living	Grocery	Restaurant	Specialty	General	Medical	University					Daycare	Elem. School
	Low-Rise	Mid-Rise	High-Rise														
Unit	DU <sup>1</sup>	DU	DU	DU	GFA <sup>2</sup>	GFA	GFA	GFA	GFA	GFA	GFA	Rooms	GFA	GFA	GFA	GFA	
Core	32	<b>833</b>	<b>1465</b>		<b>225</b>	25	26	42.6	20	7	10	120	26	13	6.18	36	
Outside Core	123	113	684	211								130			4.12		
Uplands	6			19													
TOTAL	161	<b>946</b>	<b>2149</b>	230	<b>225</b>	25	26	42.6	20	7	10	130	120	26	13	10.3	36

**Notes:**

1. DU = dwelling unit
2. GFA = gross floor area (1,000 sq. ft.)

#### 3.2. Trip Generation Methodology - Updated

The trip generation development includes a combination of trip generation based on rates identified in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition (2017), internalization of trips, transit ridership, and active mode use.

With future forecast transportation analyses such as this, there are numerous assumptions that are arrived at based on research and data, which are input into the analysis tools. A conservative approach has been undertaken to ensure future transportation system operations have adequate robustness to accommodate change, like variations in population and travel behaviour, especially over a 20-year forecast horizon.

The trip generation methodology included a number of reductions which are explained in the TIA. Two reductions have been adjusted in this Addendum which are the reduction for residential uses (Residential Reduction) and the Work from Home reduction (WFH)<sup>1</sup>. The changes are as follows:

<sup>1</sup> The term “Work from Home” can also be referred to as “Live/Work”

- **Residential Reduction:** This is based on the difference in the assumed persons per unit (ppu) between the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition (2017) and that proposed by BPP. With the proposed increase in residential square footage, some of the multi-family units will accommodate an additional bedroom and therefore have a higher assumed ppu than before. The adjustments to the land use (increase in residential floor area and the change in the number of units per land use type) as part of this Addendum yields an increase in the average ppu for the Multi-Family Mid-Rise and Multi-Family High-Rise units. The difference in population for the Multi-Family units between the ITE results and the proposed BPP total is close to 6%. As a result, the Residential Reduction has been reduced from 15% in the TIA to 6% in this Addendum and is only applied to the Multi-Family land uses.
- **Work from Home Reduction:** Further review was undertaken utilizing current travel data, and it was noted that in the 2021 Census the Work from Home percentage for West Vancouver increased from 21% to 40% and is a reflection of the change in commuting patterns as a result of the COVID-19 pandemic. With travel behaviour now settling to a new normal, as more people returned to the office full time or under a hybrid arrangement, the current West Vancouver Work from Home rate is likely between 20% and 40%. Given that Cypress Village's land-use and demographic patterns likely differ from average West Vancouver attributes, the Work from Home percentage reduction was increased from 10% in the TIA to 15% in this Addendum. This is still considered conservative as it is less than half of the 2021 Census estimate. Therefore, outbound morning residential trips and inbound afternoon residential trips were reduced by 15% to represent the impact of work from home arrangements.

The updated trip generation methodology flow chart is shown in **Figure 2**. The only changes to the flow chart since the TIA are shown in **Bold**.

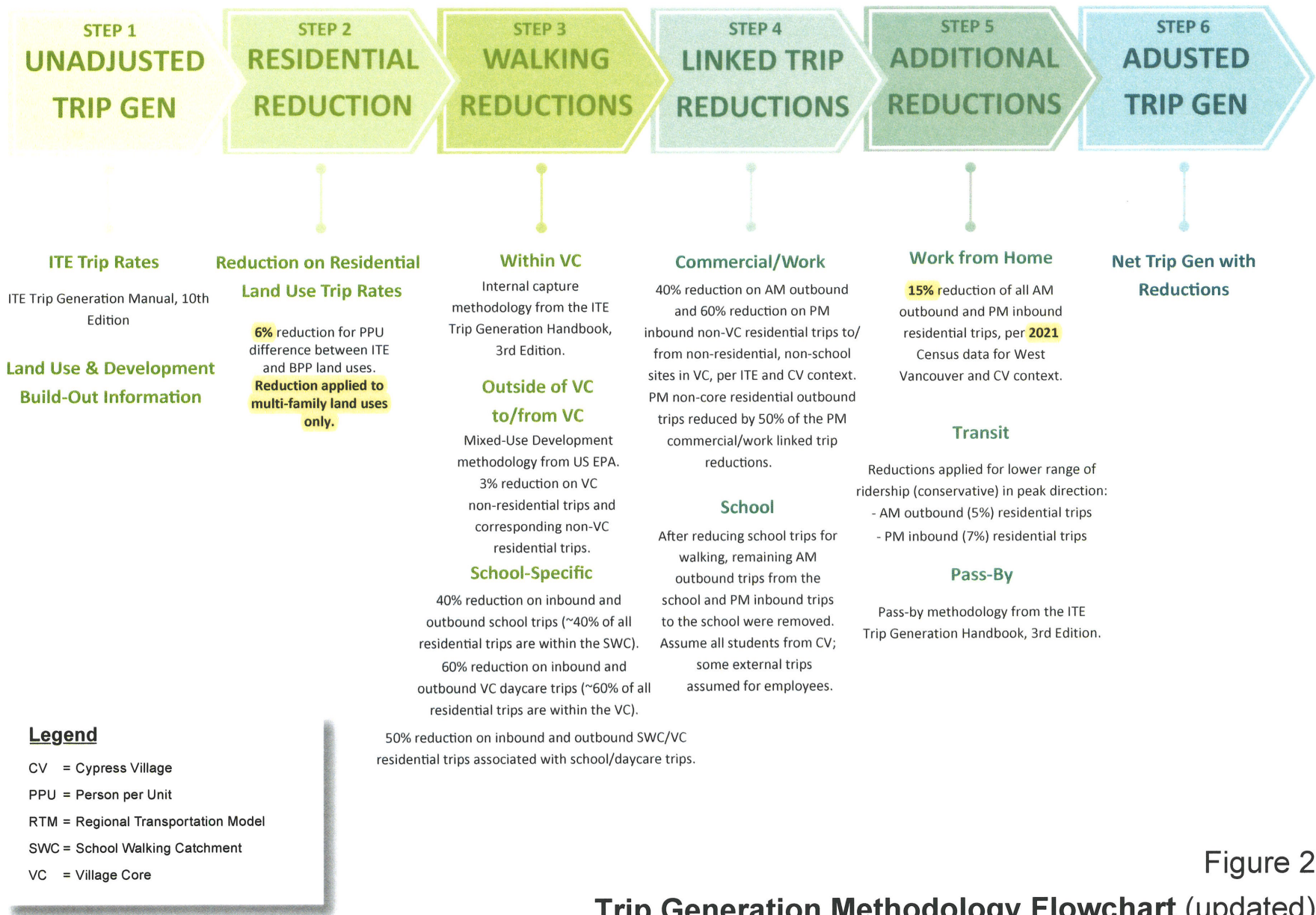


Figure 2  
Trip Generation Methodology Flowchart (updated)

### 3.3. Total Net Vehicle Trips - Project Traffic - Updated

The updated resulting total net adjusted vehicle trips on the external road network is summarized in **Table 3**.

**Table 3: Net New External Vehicle Trips - Updated**

	Subtotal Unadjusted Trips	Residential Reductions	Walking Reductions			Linked Trip Reductions		Additional Reductions			Total Net Adjusted Trips
			Core	Non-Core	School	Commercial	School	Work from Home	Transit	Pass-By	
AM Vehicle Trips	2,400	62	166	58	188	220	168	92	43	69	1,334
In	1,025	14	83	29	97	110	84	0	13	38	557
Out	1,375	48	83	29	91	110	84	92	30	31	777
PM Vehicle Trips	2,674	73	506	62	37	310	30	96	83	42	1,435
In	1,487	47	253	31	18	124	15	96	59	23	821
Out	1,187	26	253	31	19	186	15	0	24	19	614

### 3.4. Project Trip Distribution - Updated

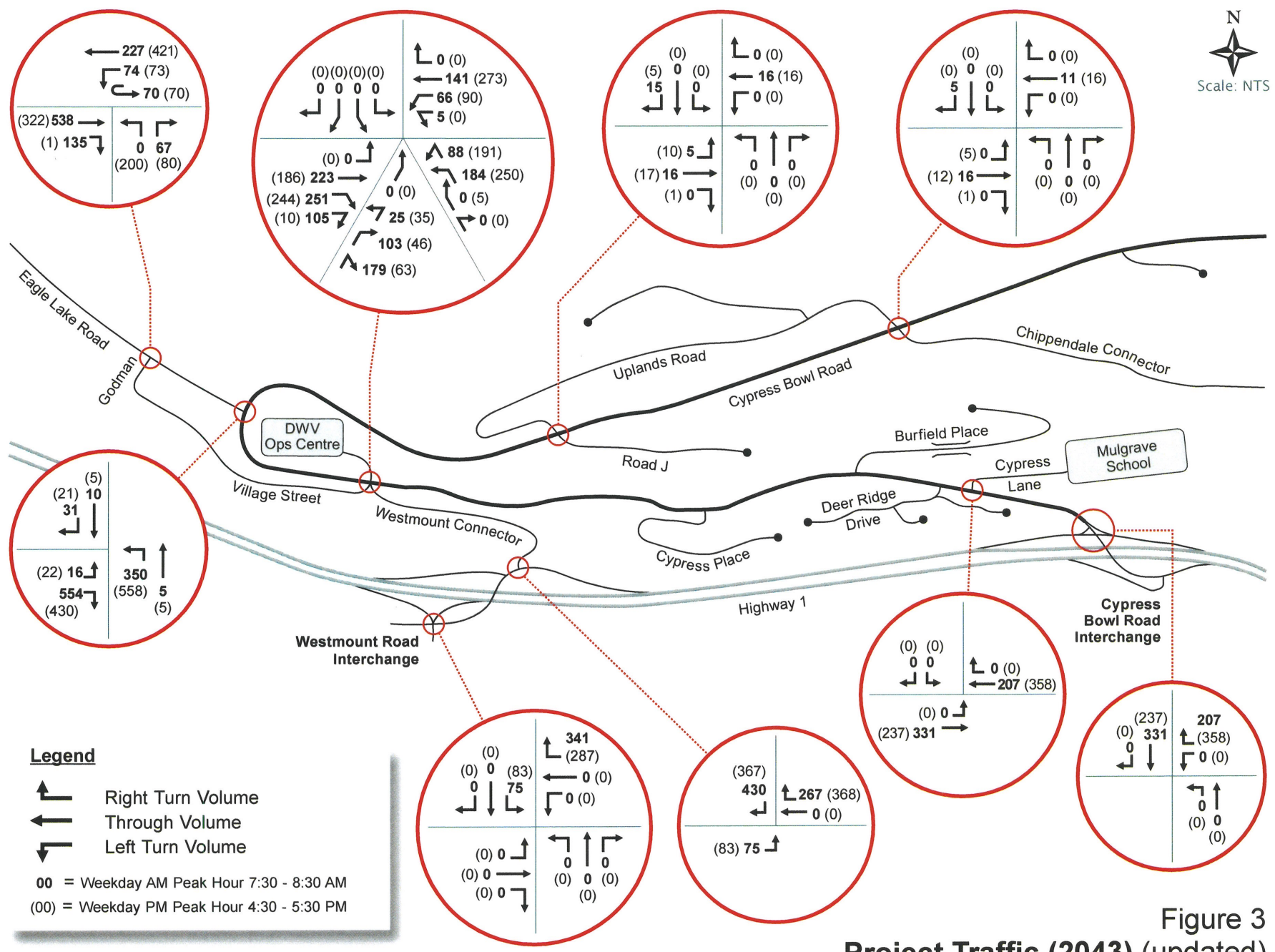
As in the TIA, the trip distribution for the village was separated into two components:

- Internal Trip Distribution - how trips are made between the internal land use pods and the accesses on Cypress Bowl Road
- External Trip Distribution - how trips are made between the Village and external destinations (e.g. eastbound and westbound Highway 1, Westmount Connector vs. Cypress Bowl Road East, etc.)

All the additional new trips were assumed to be external trips to the Village and assigned to the network using trip distribution information from the Municipal Analysis and engineering judgement.

### 3.5. Project Traffic Volumes - Updated

The updated project traffic volumes for Cypress Village for build out (year 2043) are shown in **Figure 3** on the future network.



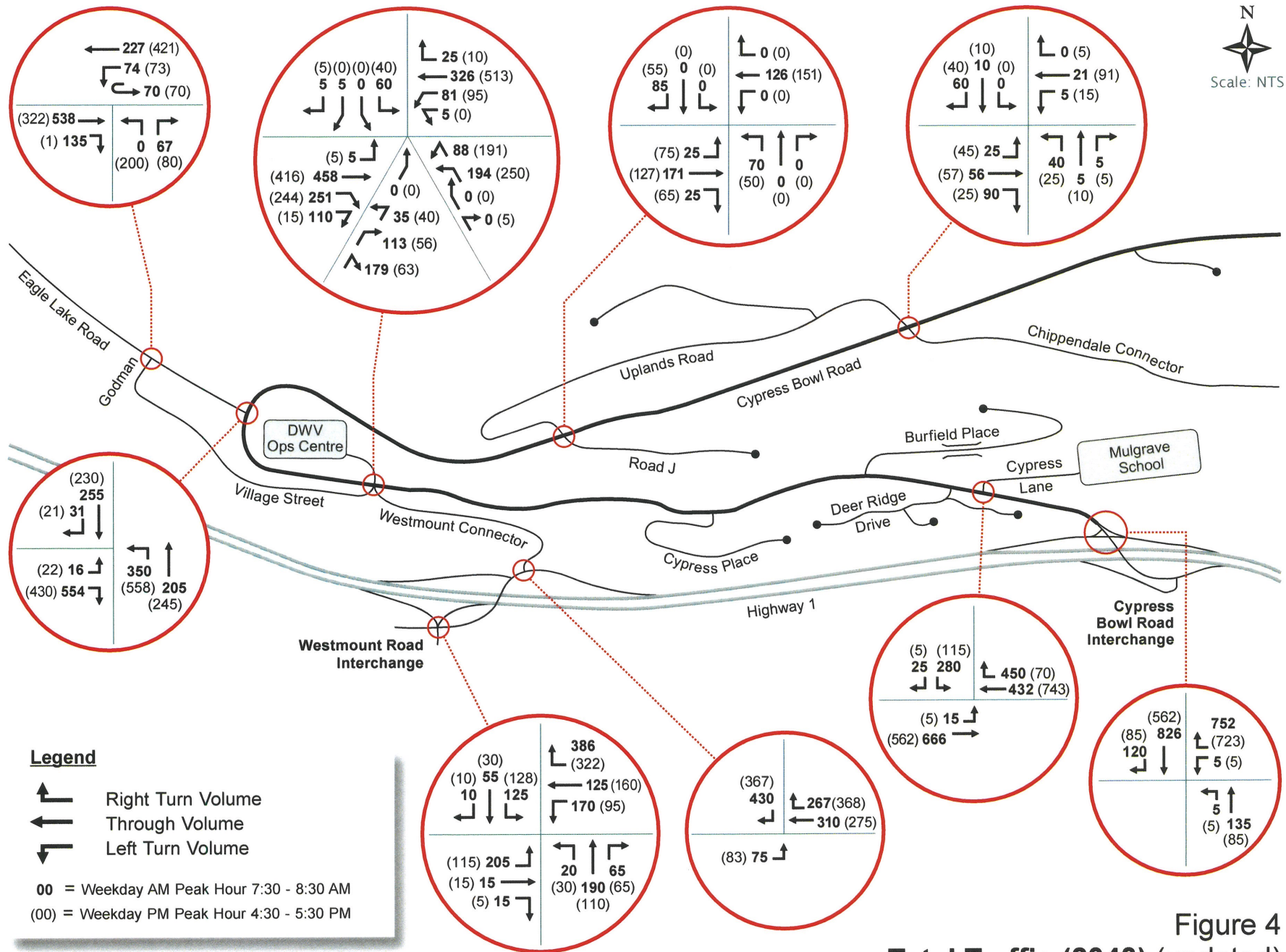
## 4. Future Traffic Volumes - *Updated*

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This section outlines the development of the future traffic volumes. This includes the total combined traffic (background traffic plus the updated Cypress Village traffic) for full build out by year 2043.

### 4.1. Opening Day: Total Traffic Year 2043 - *Updated*

To estimate the future traffic volumes for 2043 the Background traffic volumes for 2043 were used as a base and the updated Project traffic was added to produce the total combined traffic for year 2043 volumes as shown in **Figure 4**.





## 5. Analysis

This section outlines the methodology used, assumptions and results of the traffic analysis for Cypress Village land use.

### 5.1. Methodology - as in TIA

As in the TIA, the analysis was based on the assumptions, future land use scenarios and future transportation networks described in previous sections. A Vistro model was developed to support the analysis.

The Synchro software suite was used for the traffic analysis for the existing and the ultimate horizon for the unsignalized and signalized intersections. This analysis was based on the procedure and methods of the Highway Capacity Manual (HCM) for signalized and unsignalized intersections. The proposed roundabouts were analyzed using the Sidra software. Highway Capacity Software (HCS) was used to analysis the Highway 1 on-ramps.

Operations of roadway facilities are described in terms of Level of Service (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to manoeuvre. Six service levels are defined ranging from LOS A, the best operating conditions, to LOS F, the worst operating conditions. LOS E corresponds to “at or near capacity” operations. When volumes exceed capacity, stop-and-go conditions result, and operations are designated LOS F.

The calculated 95<sup>th</sup> percentile queue length is also reported in terms of length (m) where the space occupied by a car is approximately 7m.

The LOS and the 95<sup>th</sup> percentile queue lengths are presented in **Table 4**. The ramp analysis output is described in **Table 5**.

**Table 4: Level of Service Criteria for intersections**

Level of service (LOS)	Average delay for Unsignalized intersections / Roundabout movements (seconds per vehicle)	Average delay for Signalized intersection movements (seconds per vehicle)
A	0-10	0-10
B	10-15	10-20
C	15-25	20-35
D	25-35	35-55
E	35-50	55-80
F	> 50	> 80

Table 5: Level of Service Criteria for ramps

Level of Service	Maximum Density (Passenger Cars Per Kilometer Per Lane)
	Freeway Weaving Segments and Ramp Junctions
A	≤ 6.3
B	> 6.3 - 12.5
C	> 12.5 - 17.5
D	> 17.5 - 21.9
E	> 21.9
F	Demand Exceeds Capacity

### 5.2. Future Network (2043) - as in TIA

As in the TIA, the review of the traffic operations indicated that new infrastructure would be needed for key locations. This included:

- **Signalization at Cypress Lane and Cypress Bowl Road:** The current manual traffic control at this intersection will not be sustainable in the long term and signalization will be necessary to manage the traffic demands for Mulgrave School and the Village.
- **Signalization at Westmount Road and Westridge Avenue:** The 4-way stop will not be able to accommodate the future traffic demand with the Westmount Connector traffic. As such a signal will provide added capacity and safer operations in the future.
- **Signalization at Highway 1 off-ramp and Westmount Connector:** This was previously discussed with MOTI and the recommendation from staff was that signalization for this access can be allowed.

### 5.3. Future Conditions (2043) - Updated

The Background Traffic 2043 volumes and the Updated Total Traffic 2043 volumes were analyzed using the future network as shown in **Figure 1**.

The future road network, with the adjusted land use and planned improvements noted above, operates in a similar manner to the analysis in the TIA. The network can accommodate the future forecast traffic associated with Cypress Village at acceptable levels of service. All intersections operate at LOS C or better and the interchange on-ramps operate at LOS D or better.

The study intersections are listed below with commentary on the future operation.

- **Cypress Bowl Road / Highway 1 Off-ramp:** The analysis of this intersection identified that further improvements than those already planned were needed. An option for improvement includes adding a half signal for westbound and northbound movements together with adding additional lanes along Cypress Bowl Road between the north side of the interchange and Cypress Lane. This improvement would increase the safety of

the operations at the intersection with clearly defined rights of way and increased capacity for the peak operations. The analysis of this intersection at full build out indicates that the LOS and queue lengths would be similar to the TIA analysis with all movements operating at LOS B or better and with manageable queues.

- **Cypress Bowl Road/Cypress Lane:** This intersection is proposed to be signalized in the future network. The analysis of this intersection at full build out indicates that the LOS and queue lengths would be very similar to the TIA analysis. All movements operate at LOS B or better and with manageable queues. The eastbound through movement in the AM peak has moved from a LOS A to B.
- **Road J / Cypress Bowl Road:** No updated analysis of this intersection was undertaken as the difference in traffic volumes with the new land use was less than 5 vehicles and therefore the TIA analysis is retained. This intersection is planned with stop control for Road J and Uplands Way. This intersection will operate well in full build out, with all movement operating at LOS C or better.
- **Chippendale Road / Cypress Bowl Road:** No updated analysis of this intersection was undertaken as the difference in traffic volumes with the new land use was less than 5 vehicles and therefore the TIA analysis was retained. As noted in the TIA, this intersection is planned with stop control for Chippendale Road and Uplands Way. This intersection will operate well in full build out, with all movement operating at LOS B or better. Although this intersection does not warrant a traffic signal at this time, it is proposed that this intersection be monitored for delays especially for the pedestrian movements with the proximity to the new Mountain Pathway. The intersection has been pre-ducted for signals and the warrants for a future pedestrian signal can be assessed in the future.
- **Westmount Road / Westridge Avenue:** With the Westmount Connector constructed, there will be an increase in traffic accessing this intersection on the way to and from the Village. As such, the future control is recommended as full signalization with a westbound right turn channelized bay. The west access to the Chevron gas station should be closed as it will be too close to the new signal. The analysis of this operation at full build out indicates that the LOS and queue lengths would be very similar to the TIA analysis. All movements operate at LOS B or better and with manageable queues.
- **Westmount Connector / Highway 1 Off-ramp:** The Westmount Connector will access the Westmount Interchange at the westbound off-ramp as a full signal. In addition, westbound traffic will be able to access the Connector northbound from Westridge Way. The analysis of this operation at full build out indicates that the LOS and queue lengths would be very similar to the TIA analysis. All movements operate at LOS B or better and with manageable queues. The westbound queue is estimated to extend not more than 45m west of the intersection and should not back onto the highway.

- **Roundabouts:** As noted in the TIA, there are three new roundabouts proposed for the future network:

**Cypress Bowl Road / Village Street / Westmount Connector**

**Cypress Bowl Road / Eagle Lake Road**

**Eagle Lake Road / Godman Way**

The three roundabouts will all operate effectively with LOS C or better. (This is a change from the TIA which concluded that all roundabouts operate effectively with LOS B or better). Estimated queues do develop in the peak direction at Village Street roundabout with a maximum queue length of 85m in the AM eastbound movement (instead of 70m in the TIA) and 110m in the PM westbound movement (instead of 85m in the TIA). These queues can be managed within the road layout and do not block accesses or other intersections.

- **Highway interchange eastbound on-ramps:** Additionally, the two highway eastbound on-ramp merge sections were analyzed at the Westmount and Cypress Bowl Road interchanges. The analysis outcomes are very similar to the TIA report. Based on the HCS analysis, with full buildout of the site in Year 2043, the Cypress Bowl Road eastbound on-ramp would operate at LOS D (AM peak) (which is the same as in the TIA). It should be noted that this on-ramp also operates at LOS D under the 2043 background conditions (i.e. without development traffic). The Westmount eastbound on-ramp would operate at LOS C during both peak hours in 2043 under the total traffic conditions (i.e. with development traffic) (which is the same as in the TIA).

The proposed future network as a result of this analysis is shown in **Figure 5**. (This is the same as **Figure 21** in the TIA).

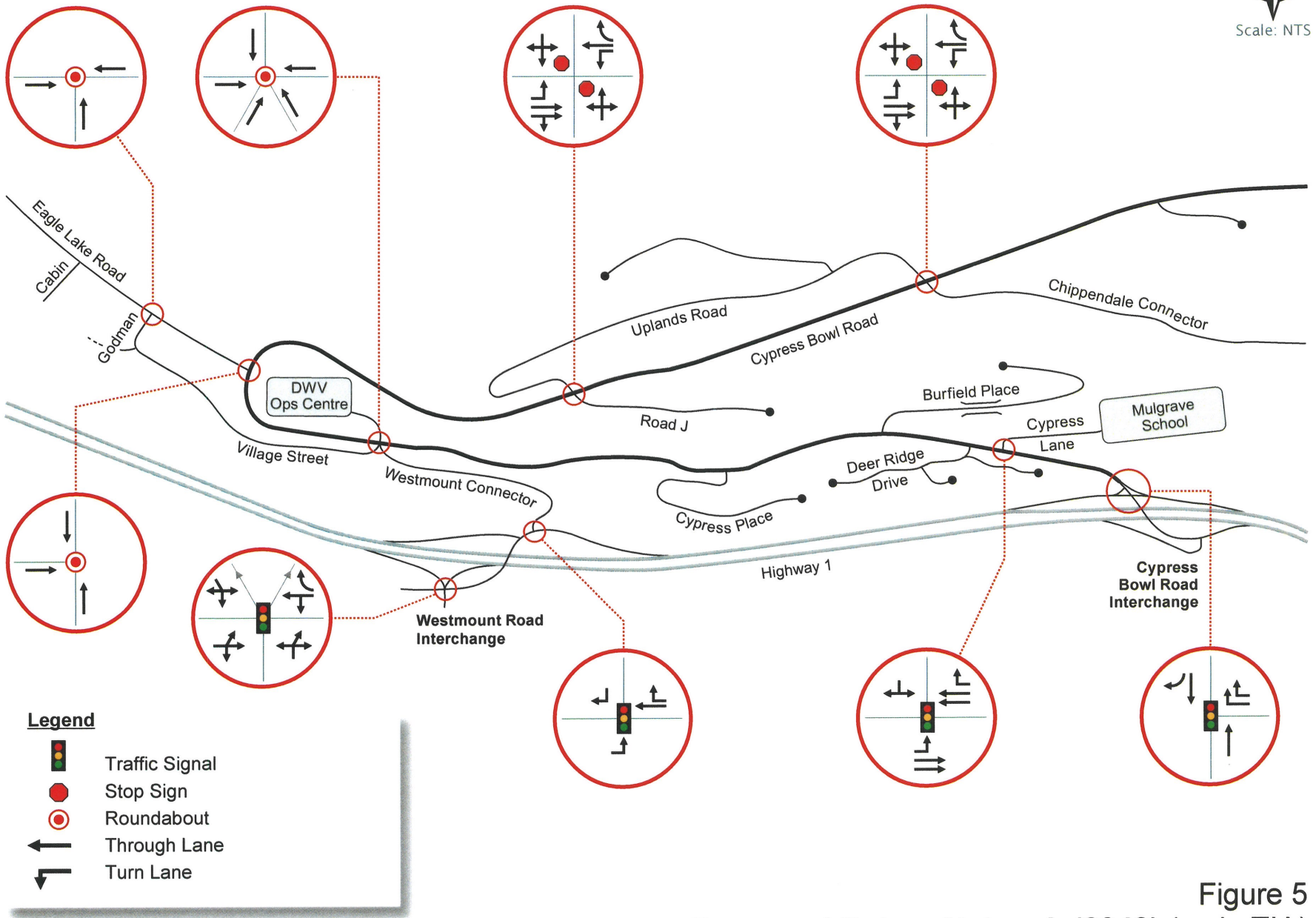


Figure 5  
Proposed Future Network (2043) (as in TIA)

## 6. Conclusions

The following conclusions are made based on the review and analysis completed. These are the same as in the TIA, except for text in **bold** which has been updated in this Addendum.

- **FUTURE ROAD NETWORK:**
  - BPP has committed to constructing the following improvements for full build out in order to accommodate future traffic:
    - Widening of Cypress Bowl Road from Highway 1 to Cypress Lane with an additional traffic lane in each direction
    - Highway 1/Cypress Bowl Road - additional westbound right turn lane and half signal for westbound/northbound movement only
    - Full traffic signal at Cypress Bowl Road and Cypress Lane
    - Westmount Connector - A new two-way road connecting Cypress Bowl Road to the Westmount Interchange
    - Full signal at Westmount Connector/Highway 1 westbound off-ramp
    - Full signal at Westmount Road/Westridge Avenue with a westbound right turn lane
  - Cypress Village will have two main access points which will include two roundabouts at the intersections of Cypress Bowl Road and Village Street and the realigned Eagle Lake Road.
  - Internal to the Village road network, there will be a roundabout at Godman Road/Eagle Lake Road.
- **FUTURE TRANSIT AND ACTIVE MODE NETWORK:**
  - An Independent Transit Service is proposed during the first few years of development of the Village to encourage transit use before TransLink service is introduced. The route would operate between Cypress Village and Park Royal with an assumed 15-minute peak frequency at full build out.
  - The Village will have a comprehensive active transportation network including multiuse pathways, sidewalks and bicycle facilities.
- **PROJECT TRIPS:**
  - Reductions were applied to trip generation estimates to reflect internal trip reductions including household size and other travel modes/choices, such as walking, linked trips and working from home. External trip reductions were applied to reflect transit use and pass-by traffic.
  - The total project external vehicle traffic generated by Cypress Village is estimated at **1,334** two-way trips in the AM peak hour (**557** inbound and **777** outbound) and **1,435** two-way trips in the PM peak hour (**821** inbound and **614** outbound).
- **ANALYSIS:**
  - The future road network operates well at full build out of Cypress Village with all the intersections operating at LOS C or better.
  - The interchange on-ramps operate at LOS D or better.
  - Further monitoring of the operation of the intersection of Chippendale Road/Cypress Bowl Road is recommended as pedestrian demand increases, with the consideration of a pedestrian signal.

## 7. Recommendation

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The transportation impact of the updated Cypress Village land use can be accommodated by the future transportation network upgrades proposed by BPP and no additional improvements are required.

Respectfully submitted,



October 18, 2023

**Donna Howes, P.Eng., PTOE, FEC**

Director  
Howes Technical Advantage Ltd.  
Permit to Practice # 1000164

*Proudly certified as a leader in quality management under  
Engineers and Geoscientists BC's OQM Program from 2015 to 2021.*

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# Technical Memorandum

**To:** Bryce Tupper, British Pacific Properties (BPP)

**From:** Donna Howes, P.Eng., PTOE, FEC, Howes Technical Advantage Ltd.  
Basse Clement, P.Eng., M.A.Sc., McElhanney Ltd.  
Ali Darwiche, P.Eng., M.Sc., McElhanney Ltd.

**Date:** November 30, 2022

**Re:** **BPP Cypress Village – Municipal Analysis:  
Summary of Findings**

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## 1. Introduction

A comprehensive transportation study was undertaken for British Pacific Properties (BPP) and the District of West Vancouver (DWV) to understand the potential transportation impacts of the proposed Cypress Village development. The first stage of the study is a municipal assessment (referred to as the “Municipal Analysis”) which focuses on Cypress Village’s traffic impacts outside of the development site including Highway 1, the District of West Vancouver (DWV) and wider North Shore arterial road network including the Burrard Inlet bridges. This stage of analysis took place during Phase 1 of the District of West Vancouver’s Planning the Upper Lands process and was updated following Phase 3. Specific outputs from the Municipal Analysis, such as background growth and trip distribution, served as inputs into the second stage of the study, referred to as the “Local Analysis”, otherwise known as the Traffic Impact Assessment (TIA). The Local Analysis provides a detailed assessment of traffic generation, circulation and operations within the development study area and at the site’s access and egress points. The Local Analysis is the study required for the rezoning process by both the District of West Vancouver and the Ministry of Transportation and Infrastructure. A synopsis of the Municipal Analysis, including the main findings, are presented in this summary.

## 2. Background

Cypress Village is a proposed mixed-use development near the first switchback on Cypress Bowl Road in the District of West Vancouver. The development offers a variety of housing types and incorporates several elements of smart growth, including retail space, new jobs, and an elementary school.

## 3. Regional Transportation Model (RTM) Overview

The main tool used for the Municipal Analysis is the latest version of TransLink’s travel demand forecasting model, RTM version 3.4<sup>1</sup>, which is developed and maintained by TransLink and uses the EMME software platform. The RTM is extensively used across the Lower Mainland to generate

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<sup>1</sup> At the time of this project, RTM 3.4 was the latest release available.

travel demand forecasts for many large-scale projects, such as the Highway 1 Lower Lynn and Surrey-Langley Skytrain business cases. Furthermore, the RTM is widely used in the region to assess the impacts of municipal land use plans and new developments such as the Coquitlam City Centre transportation plan and Lynn Creek Town Centre development.

The RTM is comprised of 1,700 Traffic Analysis Zones (TAZ)<sup>2</sup> and is validated and calibrated to local pre-COVID travel surveys, using specifically the TransLink trip diary and screenline surveys. The RTM forecasts travel demand for two horizon years, 2035 and 2050, based on land-use/demographic projections provided by Metro Vancouver. Each municipality provides land use inputs to Metro Vancouver based on their Official Community Plan (OCP) targets. Both horizon years also account for future changes in the transportation network including new road and transit infrastructure adopted in the Mayor’s Council Vision for Transportation. RTM calculates average weekday (24-hour) travel demand by different modes and assigns traffic and transit demand to the networks for three distinct time periods: morning peak hour, mid-day hour and afternoon peak hour.

#### 4. Methodology

The following provides a high-level step-by-step outline of the Municipal Analysis study methodology.

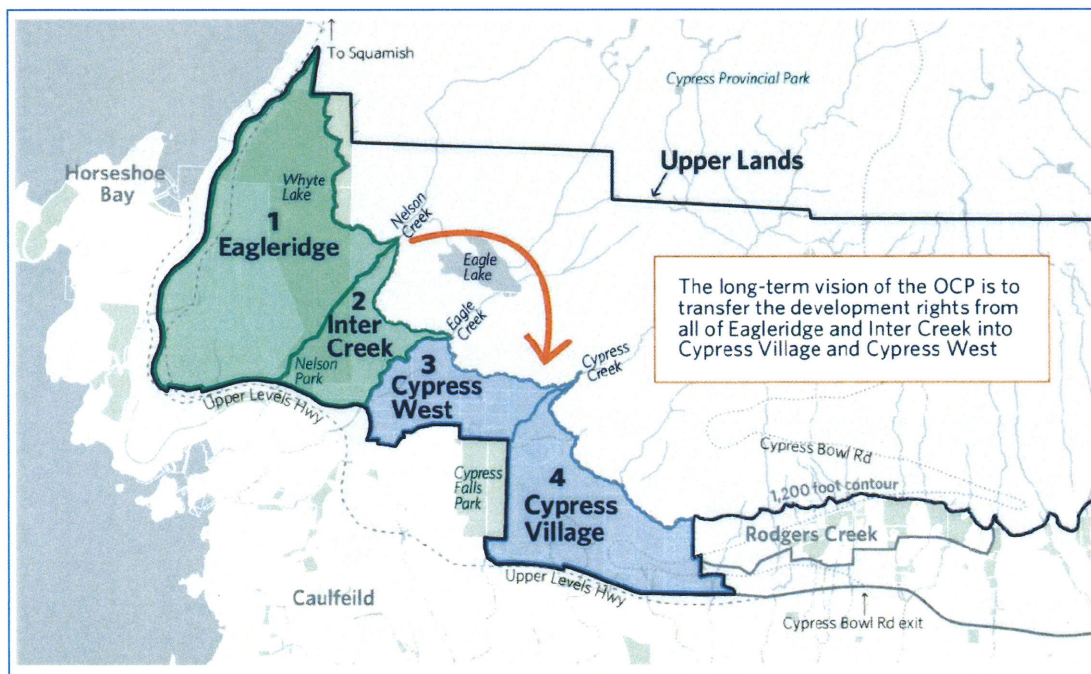
- 1) Model Validation and Calibration: The RTM’s base year (2017) modelled traffic volumes were validated against existing traffic counts in the study area and adjustments were made which were later carried forward to the future year (2043) model runs. These adjustments provided better representation of local travel conditions.
- 2) Cypress Village Land Use Confirmation: The RTM’s land use inputs for Cypress Village, within the context of the West Vancouver Official Community Plan and Metro Vancouver growth projections, were confirmed with the District of West Vancouver and BPP. Cypress Village falls within the Upper Lands area which is shown in **Figure 1**.
- 3) Future Network Assumptions:
  - a. *Transit*: The Cypress Village development includes frequent bus service between Cypress Village and Park Royal with a reliable, regular service during peak hours at build-out. The transit service modelled in the RTM represents a mode split consistent with the mixed-use neighbourhood of Ambleside in West Vancouver and the potential transit market in Cypress Village.
  - b. *Westmount Connector*: A new two-lane connection is planned between Cypress Bowl Road and Westmount Interchange. Although the Connector was not included in the Municipal Analysis as it is considered a local upgrade, it was included in the Local Analysis.
- 4) Develop horizon year, 2043, RTM runs:
  - a. *‘No Development’ Scenario*: This scenario assumes no further development in the Upper Lands by 2043, beyond what is slated for in the Rodgers Creek Development.

<sup>2</sup> Geographical boundaries that contain demographic information and are used to load and unload trips to and from the transportation network.

This scenario was used to calculate average annual background growth on the municipal network and used as a reference point for the estimate of Cypress Village’s trip generation for the ‘Existing Single-Family Zoning’ and the ‘Mixed-Use Village Zoning’ scenarios.

- b. *‘Existing Single-Family Zoning’ Scenario:* This scenario assumes development for the Upper Lands as per existing zoning which allows for single family development. This scenario also assumes some single-family development in Cypress West but no development in Inter Creek or Eagle Ridge. It serves as the main comparator against a fully built Cypress Village.
  - c. *‘Mixed-Use Village Zoning’ Scenario:* This scenario assumes full build-out of the Cypress Village development including approximately 3,600 new housing units, 100 assisted living residences, additional retail, office and industrial floor space, a 120-hotel room and a primary school.
- 5) Summarize key findings: Key findings which include trip generation, trip distribution, mode choice and network traffic volumes were summarized and provided as input into the Local Analysis. Further, volume to capacity ratios were mapped onto the road network to help identify where there may be congestion issues in West Vancouver along with impacts to travel times to key destinations.

It is important to note that the analysis focused on the morning and afternoon peak hours, as is typically done in traffic impact studies. The forecasts generated by the RTM represent the morning, 07:30 – 08:30, and afternoon, 16:30 – 17:30, peak hours. Both time periods coincide with peak traffic volumes observed at the Lions Gate Bridge.



**Figure 1: Upper Lands in West Vancouver (District of West Vancouver, Draft Area Plan Development for Cypress Village and Eagle Ridge)**

## 5. Land Use Assumptions

Demographic summaries for the three land use scenarios are shown in **Figure 2**. The figure shows the scale of the Cypress Village development relative to the ‘No Development’ and ‘Existing Single-Family Zoning’ scenarios.



**Figure 2: High Level Demographics Summary**

## 6. Model Outputs

The results of the Municipal Analysis for the year 2043 are summarized below. Some of this output was used as input into the Local Analysis.

### 1) Background Growth Rates – Highway 1

The estimated annual background traffic growth on Highway 1 and the West Vancouver arterial road network is approximately 0.8% based on the future background growth (including Rodgers Creek) when compared to the base year 2017 RTM model.

### 2) Trip Generation (Person Trips)<sup>3</sup>

**Table 1** and **Table 2** summarize the person-trip generation by mode for the ‘Existing Single-Family Zoning’ and ‘Mixed-Use Village Zoning’ scenarios. This includes trips attracted to and from Cypress Village and internal trips. The ‘Mixed-Use Village Zoning’ scenario generates about 1,750 total two-way person-trips during the morning peak hour and 1,500 total two-way

<sup>3</sup> Person-trip<sup>1</sup> is a trip by one person in any mode of transportation. For example, if two people car pool to work in the morning, the total number of person-trips is two. The total number of vehicle trips, however, is one since only one car was used for the trip.

person-trips during the afternoon peak hour. While this scenario generates substantially more trips, a significant proportion of those either remain within Cypress Village or are made by transit and active transportation.

The 'Mixed-Use Village Zoning' scenario adds six times the number of households (3,600 additional households) relative to the 'Existing Single-Family Zoning' scenario (600 additional households). The 'Mixed-Use Village Zoning' scenario, however, generates only about 1.8 times the number of outbound person-trips made by auto during the AM peak hour (770 vs 420 'out' trips) and about 2.8 times during the PM peak hour inbound person trips (640 vs 220 'In' trips).

**Table 1: AM Peak Hour Upper Lands Trip Generation – Person Trips**

Direction	Mixed-Use Village Zoning				Existing Single-Family Zoning			
	Auto	Transit	Active	Total	Auto	Transit	Active	Total
Out	770	280	20	1,070	420	10	30	460
Internal	230	0	180	410	20	0	10	30
In	220	40	0	260	20	0	0	20
Totals	1,220	320	200	1,740	460	10	40	510

**Table 2: PM Peak Hour Upper Lands Trip Generation – Person Trips**

Direction	Mixed-Use Village Zoning				Existing Single-Family Zoning			
	Auto	Transit	Active	Total	Auto	Transit	Active	Total
Out	330	70	10	410	70	0	0	70
Internal	110	0	60	170	10	0	0	10
In	640	240	20	900	220	10	10	240
Totals	1,080	310	90	1,480	300	10	10	320

### 3) Trip Distribution

**Table 3** shows the forecast vehicle trip distribution to and from Cypress Village for the 'Mixed-Use Village Zoning' scenario. The majority of vehicle trips generated by the development stay on the North Shore.

**Table 3: 'Mixed-Use Village Zoning' Scenario - Vehicle Trip Distribution**

Area	AM		PM	
	Out	In	Out	In
Sea to Sky	13%	16%	13%	9%
Rest of West Vancouver	27%	36%	28%	27%
North Vancouver (City and District)	27%	30%	34%	26%
Lions Gate	20%	9%	13%	24%
Second Narrows	13%	9%	12%	14%

### 4) Mode Share

The overall transit share during both the AM and PM peak hours is approximately 20% indicating significant patronage for the proposed bus service which is similar to the transit

mode share in Ambleside. In the peak directions, AM Peak Hour – Outbound, and PM Peak Hour – Inbound, about one quarter of all trips are made by transit. The RTM provided vehicle reduction estimates based on transit ridership as reference for the Local Analysis’s trip generation methodology.

5) Trip Assignment:

The model output provided an understanding, at a high level, of the assignment of trips on the transportation network. **Figure 3** and **Figure 4** are tree diagrams that combine the outputs of the trip generation and trip distribution analysis in the peak travel directions, AM Peak Hour–Outbound and PM Peak Hour – Inbound. These diagrams help the reader understand the magnitude of Cypress Village-related vehicular traffic distribution within the North Shore and across Burrard Inlet, and illustrates the high degree of internal and non-auto travel. Below are some key highlights:

- About 50% of AM peak hour outbound trips are either internal trips that remain within Cypress Village or travel outside by non-auto modes (mostly transit<sup>4</sup>). This can be attributed to the close proximity of the proposed elementary school as well as denser and mixed land-use.
- About 40% of PM peak hour inbound trips are either internal or made by non-auto modes (mostly transit). This is largely attributed to the improved accessibility to non-work activities within the Village (e.g. shopping and socializing).
- The majority of vehicle trips that leave the Village in the morning (AM peak hour) or return in the evening (PM peak hour) are either destined to or from the North Shore.
- Approximately 10% of outbound AM peak hour trips (110 cars) use the Lions Gate Bridge. About 14% inbound PM peak hour trips also use the Lions Gate Bridge (110 cars).
- Approximately 7% of outbound AM peak hour trips use the Second Narrows Bridge (70 cars). About 9% inbound PM trips also use the Second Narrows Bridge (60 cars).

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<sup>4</sup> It is important to re-iterate that the results presented here are based on the target transit service levels (10-minute peak headways) assumption. The detailed Local Analysis assumed a headway of 15 minutes to be conservative regarding traffic impacts.

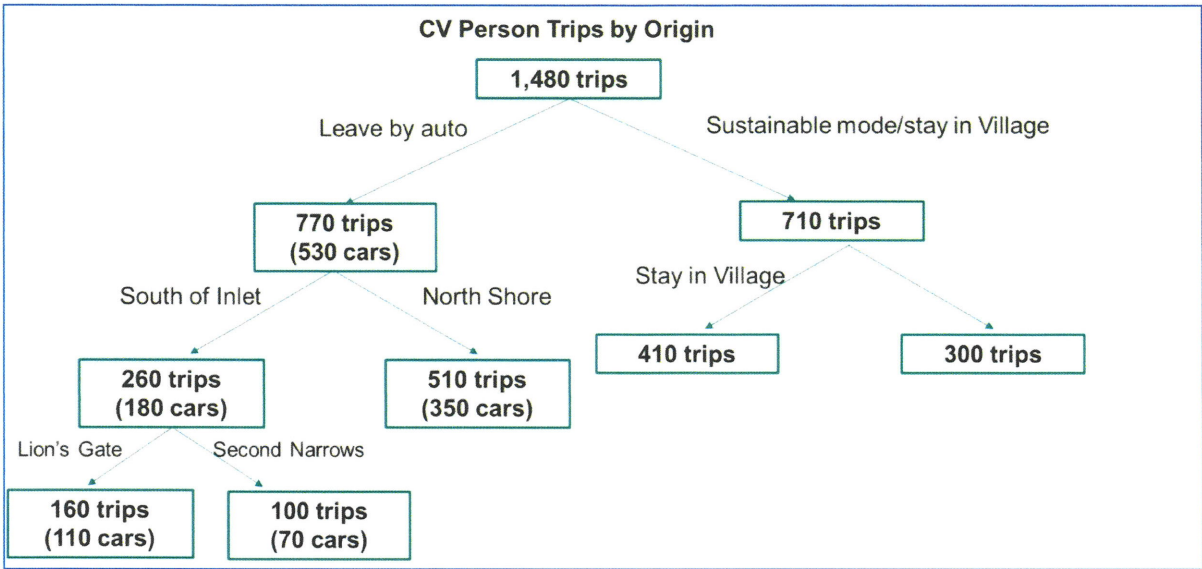


Figure 3: AM Peak Hour Tree Diagram

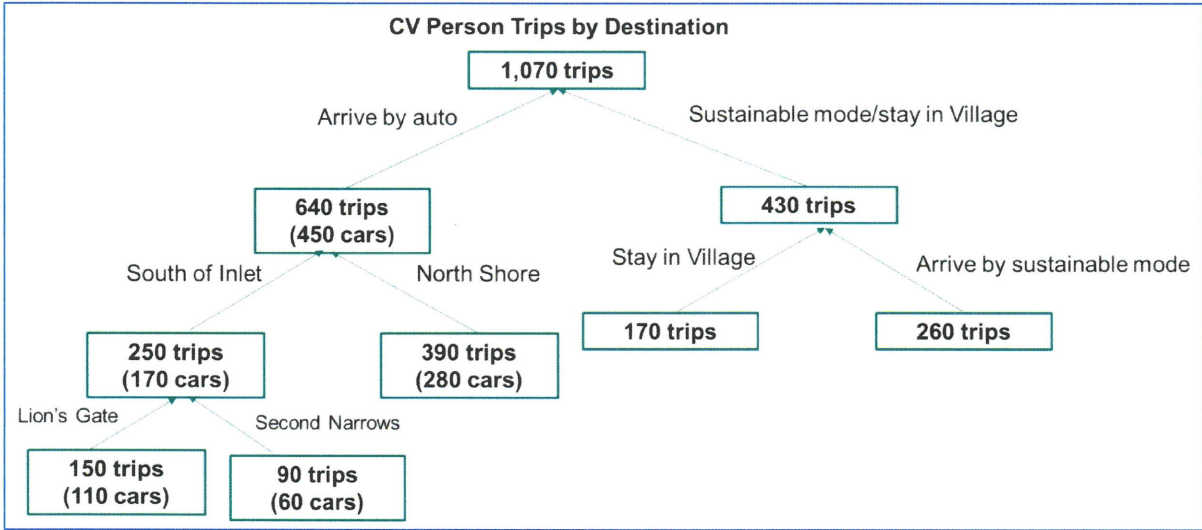
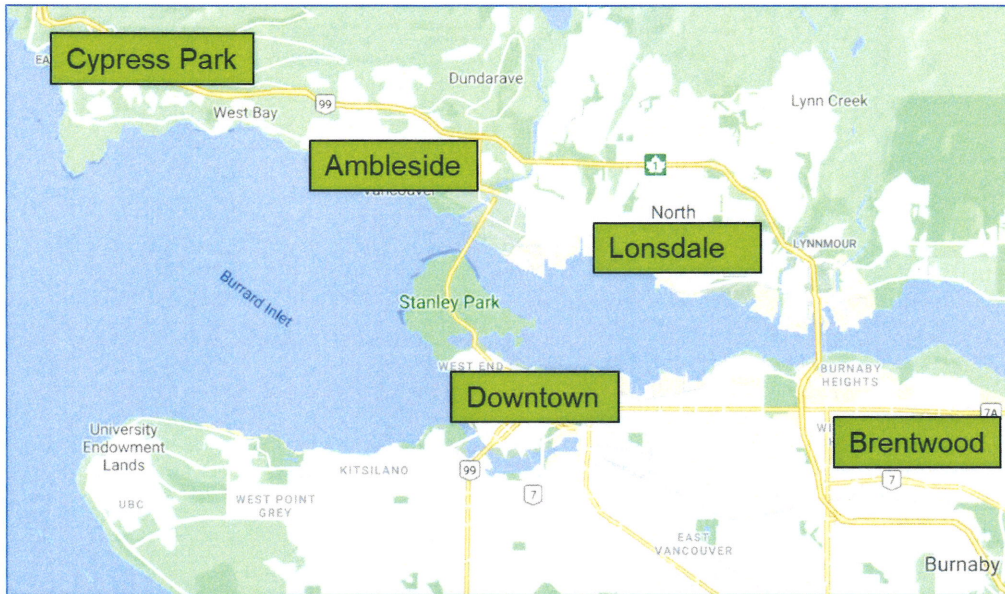


Figure 4: PM Peak Hour Tree Diagram

6) Travel Times

Travel times were extracted from the RTM to gauge the impact of additional traffic generated by the Cypress Village Development on estimated commuting trips between select origin-destination pairs. These provide a more tangible metric based on past experience driving between those locations (see **Figure 5**).



**Figure 5: Locations Used for Origin-Destination Travel Time Analysis**

The travel time differences were calculated by comparing 2019 observed travel times to the 2043 RTM modelled ‘Existing Single-Family Zoning’ and the ‘Mixed-Use Village Zoning’ scenarios outputs. **Table 4** summarizes the main observations:

**Table 4: Key Travel Time Change - Findings During the AM Peak Hour**

Trip Route	Travel Time		
	Travel Time in 2019	Additional Travel Time in 2043 for ‘Existing Single-Family Zoning’	Additional Travel Time in 2043 for ‘Mixed-Use Village Zoning’ (in addition to ‘Existing Single-Family Zoning’)
Ambleside to Downtown	8 – 17 minutes	Add 6 – 7 minutes	Add 1 – 2 minutes
Ambleside to Lonsdale	7 – 15 minutes	Add 2 – 3 minutes	Add less than 1 minute
Ambleside to Brentwood	20 – 38 minutes	Add 7 – 8 minutes	Add 1 – 2 minutes

Travel time impacts between key activity generators in the peak hours for the ‘Mixed-Use Village Zoning’ scenario are an additional 1 to 2 minutes longer relative to the ‘Existing Single-Family Zoning’ scenario.



In conclusion, travel times on the North Shore and throughout Metro Vancouver will increase over the next 20 years, regardless of whether Cypress Village is developed or not. West Vancouver residents will experience gradual increases in traffic, and longer trip times, because of regional growth (e.g. Sea to Sky, BC Ferries traffic, development in North Vancouver and the Burrard Peninsula). Adding the proposed mixed-use Cypress Village has a relatively small impact to future travel times.

#### 7) **Congested Road Segments**

The primary purpose of the proposed Westmount Connector is to provide an alternative route to and from Cypress Village, diverting some traffic away from Cypress Bowl Road. As confirmed through the Local Analysis, this will minimize traffic congestion on the road network in the area, including on the eastbound on-ramp from Cypress Bowl Road to Highway 1. The Municipal Analysis, which did not include the Westmount Connector, identified the eastbound on-ramp as a potential congested road segment. However, with the Westmount Connector, the on-ramp at the Cypress Bowl Road Interchange is shown to operate within acceptable levels of service in the Local Analysis.

Further, vehicle traffic from Cypress Village has limited impact on the Municipal network, specifically north-south routes that intersect with Marine Drive. This means that the majority of the development generated vehicle traffic will travel on Highway 1.

#### 8) **Vehicle Kilometers Travelled**

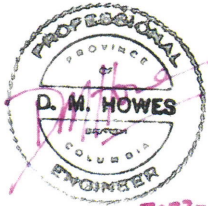
Between 2021 and 2043, when Cypress Village is expected to be completed, total daily vehicle kilometers travelled (VKT) on the North Shore major road system is expected to increase by 11% due to growth throughout the region. As of 2043, less than 1% of the total amount of traffic, or VKT, on the North Shore major road system will be related to Cypress Village.

## 7. **Conclusions**

The main conclusions of the Municipal Analysis undertaken for the Cypress Village Development using the Regional Transportation Model are:

- The 'Mixed-Use Village Zoning' scenario generates about 1,750 two-way person-trips during the morning peak hour and 1,500 two-way person-trips during the afternoon peak hour.
- A significant portion of those trips either remain in the village or travel by non-automobile mode (transit, walk and bicycle). This is largely due to the proposed denser and mixed land-use as well as the provision of frequent bus service.
- The Westmount Connector provides an alternative route to and from Cypress Village, and as a result, the future traffic volumes on the eastbound on-ramp to Highway 1 at the Cypress Bowl Road Interchange will operate within acceptable levels of service.
- A high-level investigation along other municipal roads, such as Marine Drive intersections, indicate limited impact of Cypress Village on traffic operations on other roads.
- Adding the proposed mixed-use Cypress Village has a relatively small impact on automobile travel times in future peak hours.

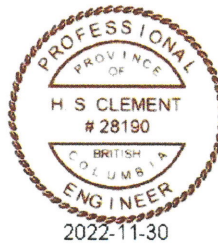
Respectfully submitted,



**Donna Howes, P.Eng., PTOE, FEC**

Responsible for Overall Project Management for the Transportation Analysis of Cypress Village  
Director

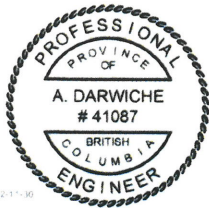
Howes Technical Advantage Ltd.  
Permit to Practice # 1000164



**Basse Clement, P.Eng., M.A.Sc.**

Responsible for Project Management for Municipal Analysis  
Division Manager – Strategic Transportation Planning  
McElhanney Ltd

Permit to Practice # 1003299



**Ali Darwiche, P.Eng., M.A.Sc.**

Responsible for Traffic Analysis for Municipal Analysis  
Division Manager – Strategic Transportation Planning  
McElhanney Ltd

Permit to Practice # 1003299

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# Technical Memorandum

**To:** Bryce Tupper, P.Eng., British Pacific Properties

**From:** Donna Howes, P.Eng., PTOE, FEC, Howes Technical Advantage Ltd.  
Basse Clement, P.Eng., M.A.Sc., McElhanney Ltd  
Ali Darwiche, P.Eng., M.Sc., McElhanney Ltd.

**Date:** April 22, 2024

**Re:** **BPP Cypress Village - Municipal Analysis  
Sensitivity Analysis Summary**

This memorandum provides a summary of the transportation sensitivity analysis undertaken for the proposed increase of 300,000 ft<sup>2</sup> in residential floor area in Cypress Village using the approved Municipal Analysis report.

## Land Use Description

The same total number of residential units was maintained at 3,711 units with slight adjustments to the quantity of the multi-family and assisted living units. All other land uses remain the same.

## Assessment

The increase in residential floor area yields an increase in average unit size for the Multi-family Mid-Rise and High-Rise units, which in turn could lead to an increase in the persons per unit (PPU) for these land use categories. This results in an increase in the PPU from 1.63 to 1.71 for the Multi-family Mid-Rise and High-Rise units. As a result, as agreed to by the District of West Vancouver (DWV), a sensitivity analysis was undertaken to better understand the impact of an increased PPU as well as the adjustments to the quantity of multi-family units and the assisted living numbers.

A high-level assessment of the land use changes to the previous Municipal Analysis was undertaken and the following changes for Cypress Village were applied:

- Adjusted the population based on the increased PPUs
- Adjusted the household size distribution
- Added the increased amount of Assisted Living to the employment

The high-level review focussed on the AM Peak outbound movements from Cypress Village at full build out (20 years) as this represents the worst-case scenario for impact on Highway 1 and the associated external network. The results are summarized below:

### Key Findings – AM Peak Hour:

- The additional vehicle trips leaving the Village eastbound is in the order of 60 vehicles.
- The increase in volume /capacity ratios is minimal on the overall network.
- The increase in travel time to downtown Vancouver from Cypress Village is in the order of 20 seconds.

The travel time routes were reviewed, and it was established that the travel time windows remain unchanged with the additional floor area. The table is repeated below for reference in **Table 1**.

**Table 1: Key Travel Time Change - Findings During the AM Peak Hour**

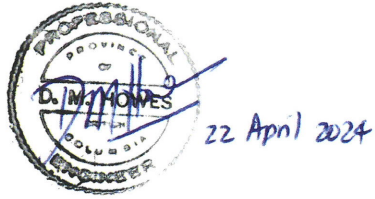
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Ambleside to Downtown	8 – 17 minutes	Add 6 – 7 minutes	Add 1 – 2 minutes
Ambleside to Lonsdale	7 – 15 minutes	Add 2 – 3 minutes	Add less than 1 minute
Ambleside to Brentwood	20 – 38 minutes	Add 7 – 8 minutes	Add 1 – 2 minutes

Therefore, the travel time impacts between key activity generators in the AM peak hour for the 'Mixed-Use Village Zoning' scenario are an additional 1 to 2 minutes longer relative to the 'Existing Single-Family Zoning' scenario.

### Conclusions

The updated Municipal Analysis with increased residential floor space results in a nominal impact to regional traffic. The overall sensitivity results reveal that given the number of possible outcomes in 20 years, there is still robustness built into the analysis to support the traffic impact of the Village and the associated future transportation network. As a result, it is concluded that, the increase in residential land use area of 300,000 ft<sup>2</sup> would present no material change to the results of the original analysis.

Respectfully submitted,



22 April 2024

**Donna Howes, P.Eng., PTOE, FEC**  
Director  
Howes Technical Advantage Ltd.  
Permit to Practice # 1000164  
*Proudly certified as a leader in quality management under  
Engineers and Geoscientists BC's OQM Program from 2015 to 2021.*



2024-04-22

**H.S. Clement, P.Eng., M.A.Sc.**  
Division Manager – Strategic Transportation Planning  
McElhanney Ltd.  
Permit to Practice # 1003299



2024-04-22

**Ali Darwiche, P.Eng., M.Sc.**  
Senior Transportation Planning Engineer  
McElhanney Ltd.  
Permit to Practice # 1003299

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