MEMO

DATE: November 27, 2017
PROJECT NO: 04-17-0049
PROJECT: UBC MacInnes Field Parkade
SUBJECT: Access Review

TO: Sean Ang
UBC Properties Trust

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This memo presents an analysis of pedestrian and vehicle movements that are expected at the parking access point to the one-level parkade proposed beneath the new MacInnes Field. It will evaluate the interaction of vehicle and pedestrian movements near the existing East Courtyard area where the MacInnes Field parkade access is planned to be located.

1. PROPOSED MACINNES FIELD PARKADE

The proposed MacInnes Field Parkade is planned to accommodate 216 parking spaces intended to serve the transient users travelling to various destinations within the University Boulevard Precinct. In March 2017, Bunt & Associates was commissioned by UBC Campus + Community Planning to assess the anticipated visitor parking demand for a number of buildings (existing and future) located within the University Boulevard Precinct. The planned parking supply was in part based on the results from the demand estimates, as well as what can physically be accommodated beneath the MacInnes Field.

2. VEHICLE AND PEDESTRIAN MOVEMENTS ESTIMATES

Vehicle trip estimates for the MacInnes Field Parkade were developed based on the number of parking spaces that are expected to be utilized by different user groups according the parking demand estimates prepared by Bunt in 2017. Depending on the specific user group, each user group would be assigned with a specific "Duration of Stay" value, which in turn would determine the number of vehicle trips that would be expected from each user group entering and leaving the parkade. **Tables 1** and **2** present the number of vehicle trips that are expected from the parkade for the Weekday Mid-day and Weekday Evening peak-hour periods, respectively.

Table 1: MacInnes Field Parkade Vehicle Trip Estimates – Weekday Mid-Day Peak-hour

USE	PEAK PARKING DEMAND	DURATION OF STAY (MINS)	VEHICLE TRIP RATE (TRIP/SPACE/HR)		PEAK-HOUR VEHICLE TRIPS	
			Inbound	Outbound	Inbound	Outbound
Alumni Centre	31	90	0.67	0.67	21	21
AMS Nest	29	90	0.67	0.67	19	19
Aquatic Centre	23	90	0.67	0.67	15	15
UBC Bookstore	6	30	2.00	2.00	12	12
Gateway North and South	5	180	0.33	0.33	2	2
War Memorial Gym Redevelopment	0	0	0.00	0.00	0	0
Sites B, D, D.H. Copp Commercial	63	90	0.67	0.67	42	42
Total	**157**	-	-	-	**111**	**111**

Table 2: MacInnes Field Parkade Vehicle Trip Estimates – Weekday Evening Peak-hour

USE	PEAK PARKING DEMAND	DURATION OF STAY (MINS)	VEHICLE TRIP RATE (TRIP/SPACE/HR)		PEAK-HOUR VEHICLE TRIPS	
			Inbound	Outbound	Inbound	Outbound
Alumni Centre	63	180	0.33	0.00	21	0
AMS Nest	29	90	0.67	0.67	19	19
Aquatic Centre	28	90	0.67	0.67	19	19
UBC Bookstore	0	0	0.00	0.00	0	0
Gateway North and South	5	0	0.00	0.00	0	0
War Memorial Gym Redevelopment	0	0	0.00	0.00	0	0
Sites B, D, D.H. Copp Commercial	63	90	0.67	0.67	42	42
Total	**188**	-	-	-	**101**	**80**

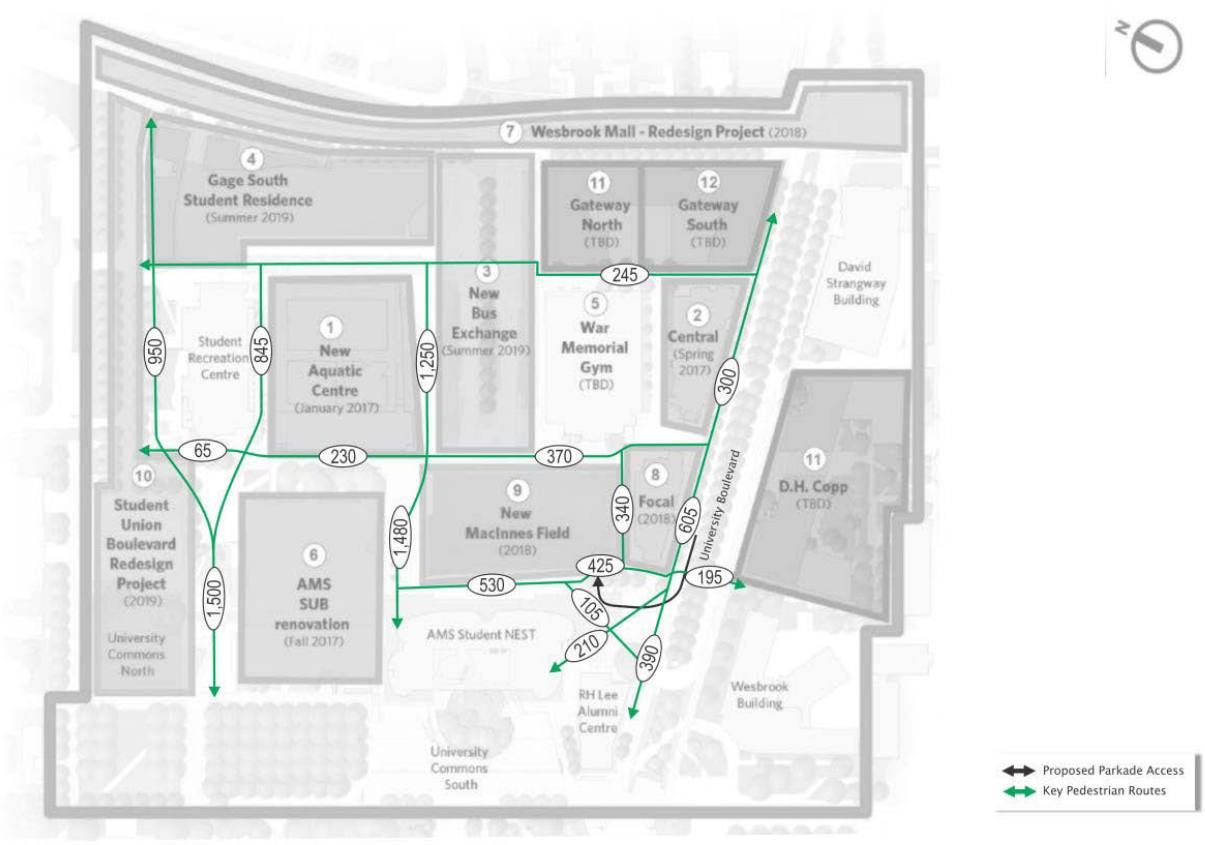
From the tables above, it can be seen that the parkade is expected to generate approximately 110 vehicles per hour, or less than 2 vehicles every minute on average, for each direction during the Weekday Mid-day Peak-hour period.

In the Weekday Evening Peak-hour period, the overall vehicle trips are predicted to be slightly lower, with more dominant movements in the inbound direction.

In terms of pedestrian movements, as part of Bunt & Associates' previous work for the UBC Bus Exchange, projections of pedestrian movements were prepared based on the configuration of the new bus exchange taking into consideration the key pedestrian corridors within the University Boulevard Precinct. In addition, Bunt conducted a field review in late August 2017 to further investigate the detailed pedestrian pattern within the East Courtyard Area of which the vehicle access and egress for the MacInnes Field Parkade would be located.

Based on the information collected, it is anticipated that there would be upward of 500 to 600 pedestrians walking across the East Courtyard Area during the Weekday Mid-day Peak-hour period. To reduce the number of pedestrians that would be walking within the East Courtyard Area, a pedestrian path will be introduced at the back of the parkade entrance providing an additional option for pedestrian to pass through the area. **Figure 2.1** below shows the pedestrian volumes that are expected at the University Boulevard Precinct with the parkade access in place.

Figure 2.1: Pedestrian Movements near University Boulevard Precinct

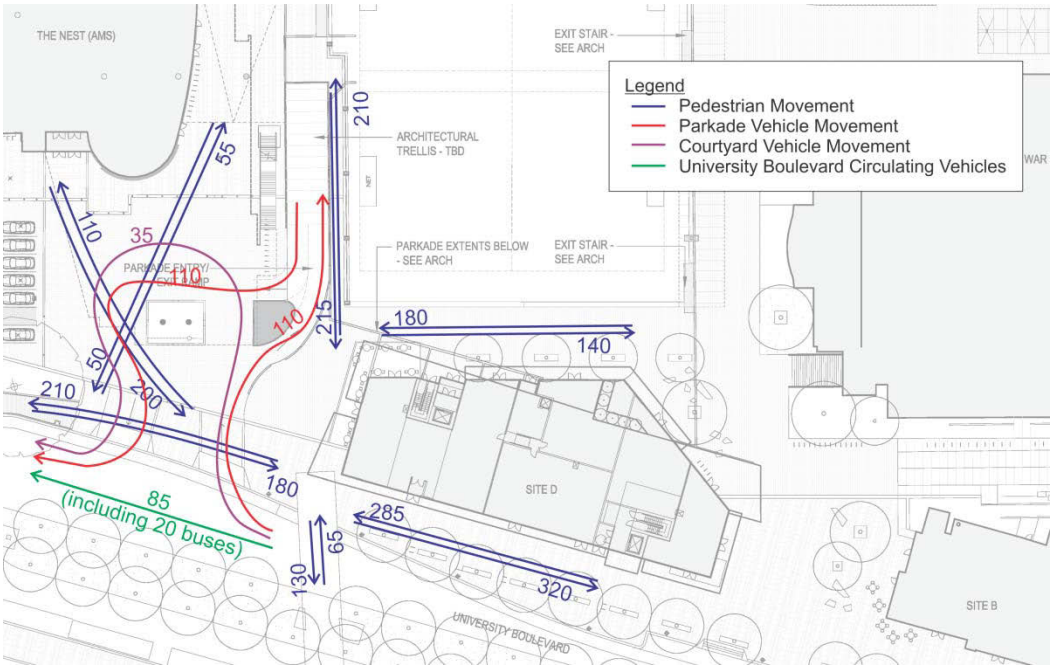


The pedestrian movements within the East Courtyard has been taken into consideration as an input to the micro-simulation model which informs the interaction of pedestrian and vehicle movements in front of the proposed access and egress of the MacInnes Field Parkade.

Figure 2.2 shows the shows the current proposal with the pedestrian and vehicle movements overlay in the courtyard area. Although not illustrated in the diagram, based on traffic count data

from UBC, approximately 105 bicycle movements can be expected on University Boulevard in the Weekday PM Peak-hour period.

Figure 2.2: Current Proposal with Pedestrian and Vehicle Movements Overlay



3. LOADING MANAGEMENT

While loading activities currently occur at the courtyard area, it is Bunt's understanding that the courtyard in fact is not a designated loading area for the AMS Nest. All loading activities for the AMS Nest should be done through the loading dock at the old Student Union Building along Student Union Boulevard. As increased vehicle and pedestrian activities can be expected in the future at the courtyard, increased enforcement should be in place to ensure loading activities for the AMS Nest should be undertaken at the designated loading area off Student Union Boulevard and not at the courtyard.

The Alumni Centre will continue to be able to utilize the parking on the west side of the courtyard for their parking and loading needs.

4. VISSIM MICRO-SIMULATION MODEL

To understand the interaction of pedestrian and vehicle movements at the East Courtyard Area near the MacInnes Field Parkade entrance, a micro-simulation model was prepared using the PTV VISSIM software package. Of particular interest was the likelihood of vehicles entering the courtyard blocking through traffic on University Boulevard.

For the purpose of this exercise, only the Weekday Mid-day Peak-hour period was modelled, as the pedestrian movements are anticipated to be much higher than that expected in the evening period.

A site visit was conducted to identify pedestrian desire lines and walking behaviors. These were then inputted into the VISSIM model to accurately reflect the locations were pedestrian-vehicular interactions would occur.

Overall, it was found that the space would function well despite the large number of pedestrians using the area. Although the space is pedestrian dominated, the micro-simulation model shows that vehicles are still able to enter and exit the parkade safely without having an overly negative effect on the pedestrian environment. Although some delay is expected for vehicles entering and exiting the parkade due to the nature of the space the vehicles are negotiating, it was found that only very minor queuing occurs at the parkade entrance and the entrance from University Boulevard. Average queue lengths at these locations are outlined in **Table 4.1**.

Table 4.1: Weekday Mid-Day Queue Results

LOCATION	AVERAGE QUEUE LENGTH (M)	AVG. NO OF VEHICLES
1 - Inbound from University Boulevard	3.57	1
2 – Outbound onto University Boulevard	5.14	1
3 – Parkade Entrance Inbound	1.32	0
4 – Parkade Entrance Outbound	0.13	0

Figure 4.1 shows an example of queuing at the entrance to the AMS nest loop from University Boulevard. Maximum queues at the entrance are 2-3 vehicles in length and occur when vehicles are required to stop for pedestrians traversing at the entrance. This type of queuing clears quickly and does not cause any blocking back onto University Boulevard.

Figure 4.1: Typical Maximum Queuing at Entrance from University Boulevard

Figure 4.2 shows an example of queuing at the exit onto University Boulevard. Maximum queues at this exit are typically 3-4 vehicles in length and can occur due to vehicles crossing a number of pedestrian desire lines. This type of queuing occurs occasionally due to the high number of pedestrians using the space.

Figure 4.2: Typical Maximum Queuing at Exit onto University Boulevard

Figure 4.3 shows an example of queuing at the exit from the MacInnes Field Parkade. Similarly, maximum queues at this exit are typically 3-4 vehicles in length and can occur due to vehicles crossing a number of pedestrian desire lines. In the micro-simulation model this type of queuing occurs infrequently and typically occurs when a number of vehicles exit MacInnes Parkade at the same time. This type of queuing does not last long and clears quickly.

Figure 4.3: Typical Maximum Queuing at MacInnes Field Parkade Exit

5. SUMMARY

The proposed MacInnes Field Parkade would accommodate up to 216 vehicles intended to serve the transient users accessing to various destinations within the University Boulevard Precinct. During the Weekday Mid-day Peak-hour period, approximately 110 vehicles, or less than 2 vehicles per minute on average, would be expected in each direction of the parkade access. A micro-simulation model was prepared to look at the interaction of pedestrian and vehicle movements at the East Courtyard area where the proposed parkade access would be located. The simulation results indicated that the parkade access would operate satisfactorily without any excessive delays for vehicles and pedestrians.