



To: **City of Port Coquitlam** Date: **December 5, 2019**
Attention: **Melony Burton** Project No.: **32419**
Cc: **Chris Boit and Andrew Robertson (ISL)**
Reference: **McAllister Avenue Streetscape – Traffic Analysis Memorandum (Revised)**
From: **Borg Chan and Omid Ebadi**

1.0 Introduction

The City of Port Coquitlam (the City) has retained ISL Engineering and Land Services (ISL) to develop high-level concept plans to upgrade McAllister Avenue, between Shaughnessy Street and Mary Hill Road, as part of the Donald Street multi-use path extension to Elgin Avenue.

According to *PoCoMAP (the City's GIS Map)*, McAllister Avenue is classified as a local road in the downtown area, which connects Shaughnessy Street in the west and Mary Hill Road in the east. The length of the study corridor is approximately 225 metres consisting of two travel lanes (one lane in each direction) and angled parking on the north side and parallel parking on the south side. The study area is surrounded mainly by commercial lots such as restaurants, retail stores, and professional services, which will be developed or redeveloped within a 20-year horizon.

There are four key intersections located in the study area (**Figure 1**), for which the road classification and designation of the intersecting street and existing traffic control type are provided:

- Shaughnessy Street (arterial) and McAllister Avenue – 4-legged signalized
- Shaughnessy Street and Elgin Avenue (local) – 4-legged stop-controlled with right-in-right-out (RIRO) movements on Elgin Avenue approaches. It was found that central plastic delineators were recently installed along Shaughnessy Street to restrict all left-turn movements at the intersection.
- Mary Hill Road (collector) and McAllister Avenue – 3-legged stop-controlled
- Mary Hill Road and Elgin Avenue – 3-legged stop-controlled

The objectives of this Traffic Analysis Memorandum are to assess the existing (2019) and future (2039) traffic conditions for the proposed McAllister Avenue cross-section design options and to provide a summary of traffic operation issues identified through the analysis. This traffic study could be used as input for the engineering work of roadway cross-section design of McAllister Avenue Streetscape.

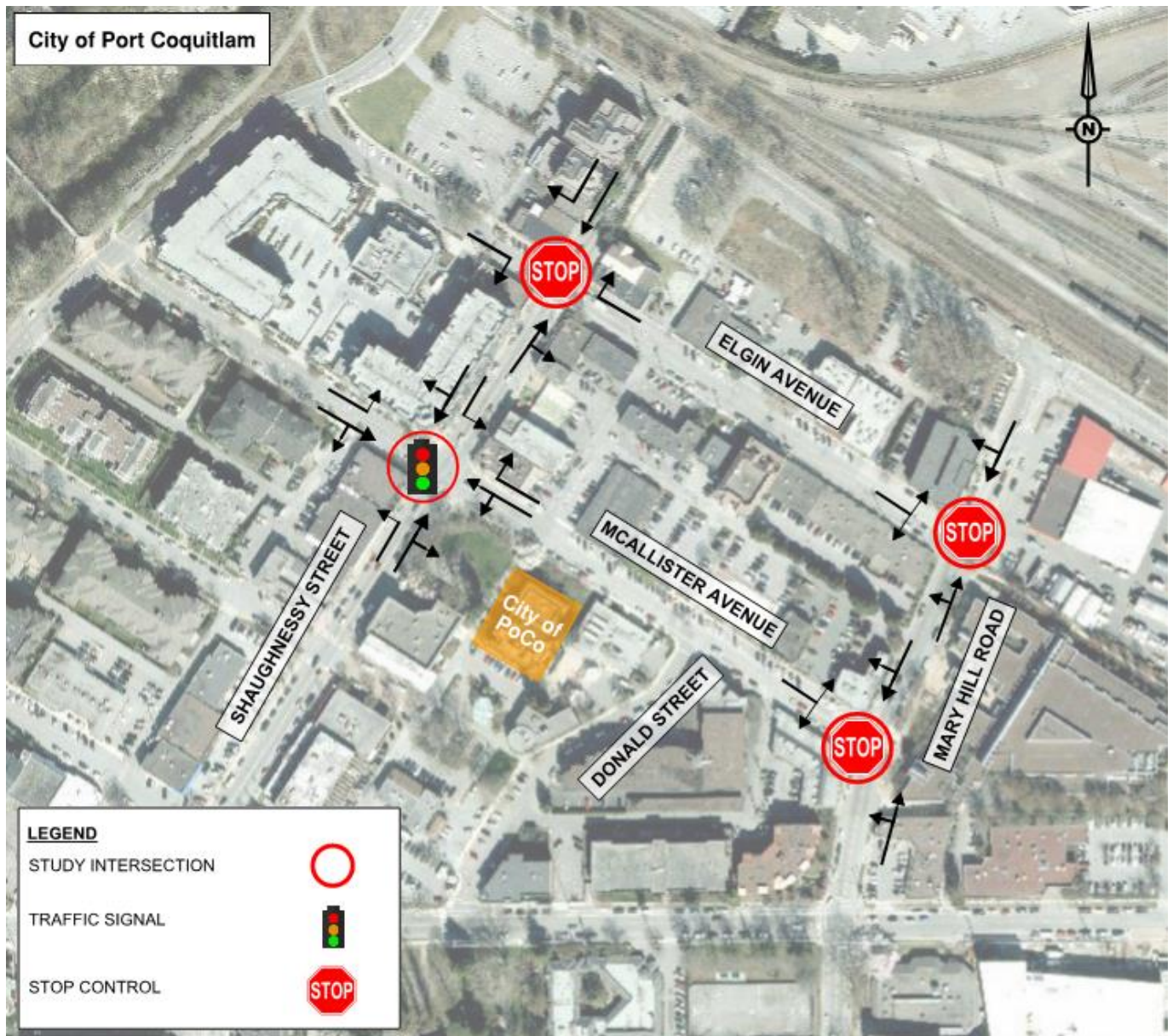


Figure 1 Study Area and Existing Lane Configurations

2.0 Traffic Volumes

2.1 Existing Traffic Volumes (2019)

Multi-year (2014-2018) traffic counts of the study intersections, including the number of crossing pedestrians and cyclists, were collected from the City. All surveyed traffic volumes were projected to 2019 using 1.5% annual background traffic growth rate from previous studies such as *Kingsway Avenue Conceptual Design* (ISL). Based on the surveyed volumes at the study intersections, the weekday AM peak hour was found to be from 0800 to 0900 hours and the weekday PM peak was found to be from 1700 to 1800 hours (5:00 to 6:00 PM).

It is understood that left-turn movements from Shaughnessy Street to Elgin Avenue were previously restricted only during the PM peak and hence the available traffic counts do not reflect the current 24-hour left-turn restriction. As a result, the following assumptions were made to redistribute the affected movements during the AM peak:

- The Shaughnessy Street southbound left-turn vehicles will turn left at the McAllister Avenue intersection – some trips will be destined to the existing parking lots on McAllister Avenue or Elgin Avenue; while, some trips will turn right onto Mary Hill Road.
- The Shaughnessy Street northbound left-turn vehicles will turn left at the McAllister Avenue intersection to access Maple Street.

The modified 2019 turning movement volumes during the weekday AM and PM peak hours are shown in **Table 1**.

Table 1 2019 Modified Traffic Volumes at Study Intersections

Study Intersection	Eastbound			Westbound			Northbound			Southbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak													
McAllister Avenue at Shaughnessy Street	45	15	15	15	15	60	20	490	35	145	520	15	1,390
Elgin Avenue at Shaughnessy Street	RE	RE	5	RE	RE	120	RE	585	10	RE	670	80	1,470
McAllister Avenue at Mary Hill Road	10	-	95	-			115	375	-	-	200	15	810
Elgin Avenue at Mary Hill Road	10	-	70	-			85	240	-	-	170	40	615
PM Peak													
McAllister Avenue at Shaughnessy Street	135	30	35	30	30	150	15	705	15	60	680	25	1,910
Elgin Avenue at Shaughnessy Street	RE	RE	40	RE	RE	235	RE	975	10	RE	725	130	2,115
McAllister Avenue at Mary Hill Road	20	-	95	-			195	290	-	-	365	40	1,005
Elgin Avenue at Mary Hill Road	25	-	55	-			80	210	-	-	380	100	850

RE: restricted movements at Shaughnessy Street and Elgin Avenue intersection

2.2 Future Development Traffic

As informed by the City, there will be 11 major developments/redevelopments within a 20-year horizon in the vicinity of the study area. **Figure 2**, provided by the City, shows the location of the future developments in the downtown area as well as the approximate completion time frame. At the time of the study, the land use data were available for eight developments (marked in red), which will be completed in two to ten years. **Table 2** shows the location (address), land use data, and the anticipated time frame for each development.

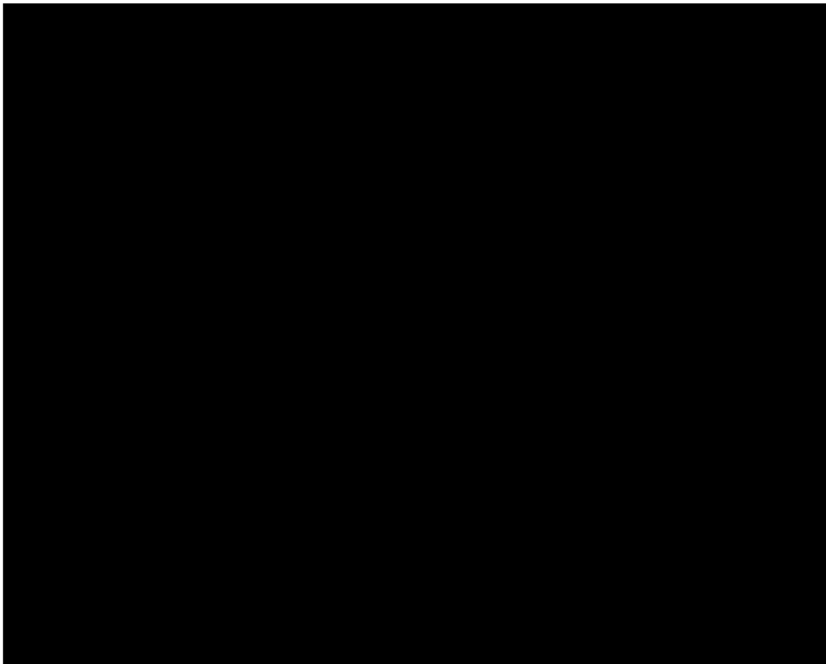


Figure 2 Future Developments Location within Downtown Area (Provided by the City)

Table 2 Future Developments Location and Land Use Data

No.		Additional Commercial/Office (Gross Floor Area)	Potential Dwelling Units	Time frame (occupancy)
1		20,000	60	< 5 years
2		20,000	0	< 5 years
3		20,000	75	< 5 years
4		-20,000	60	5-7 years
5		0	60	< 5 years
6		20,000	60	5-10 years
7		40,000	120	5-10 years
8		30,000	120	5-10 years

Negative values indicate a reduction in gross floor area compared to the existing lot.

Based on the development locations, it was assumed that five future developments will have direct traffic impacts on the operation of the study intersections, namely: #1, #2, #6, #7, and #8. Using the *Institute of Transportation Engineers Trip Generation Manual – 10th Edition (ITE Manual)*, the additional traffic generated by the future developments during the weekday AM and PM peak hours are provided in **Table 3**.

Table 3 Peak Hour Trip Generation from Future Major Developments

No.	ITE Classification (Land Use Code)	Unit	Extent	Peak Hour	Trip Rate	Two-Way Trip	Directional Split		Total Trip		
							In	Out	In	Out	
1	Multifamily Housing (Mid-Rise) (221)	Dwelling Unit	60	AM	0.36	22	26%	74%	6	16	
				PM	0.44	26	61%	39%	16	10	
	Shopping Centre (820)	1,000 ft² GFA	10,000	AM	0.94	9	62%	38%	5	4	
				PM	3.81	39	48%	52%	19	20	
		1,000 ft² GFA	10,000	AM	1.48	15	95%	5%	14	1	
				PM	1.30	13	65%	35%	8	5	
TOTAL				AM		46			25	21	
				PM		78			43	35	
2	General Office Building (710)	1,000 ft² GFA	20,000	AM	1.16	23	86%	14%	20	3	
				PM	1.15	23	16%	84%	4	19	
		1,000 ft² GFA	-10,000	AM	1.48	-15	95%	5%	-14	-1	
				PM	1.30	-13	65%	35%	-8	-5	
	TOTAL				AM		8			6	2
					PM		10			-4	14
6	Multifamily Housing (Mid-Rise) (221)	Dwelling Unit	60	AM	0.36	22	26%	74%	6	16	
				PM	0.44	26	61%	39%	16	10	
	Shopping Centre (820)	1,000 ft² GFA	10,000	AM	0.94	9	62%	38%	5	4	
				PM	3.81	39	48%	52%	19	20	
	General Office Building (710)	1,000 ft² GFA	10,000	AM	1.16	12	86%	14%	10	2	
				PM	1.15	12	16%	84%	2	10	
TOTAL				AM		43			21	22	
				PM		77			37	40	
7	Multifamily Housing (Mid-Rise) (221)	Dwelling Unit	120	AM	0.36	43	26%	74%	11	32	
				PM	0.44	53	61%	39%	32	21	
	Shopping Centre (820)	1,000 ft² GFA	20,000	AM	0.94	19	62%	38%	12	7	
				PM	3.81	76	48%	52%	36	40	
	General Office Building (710)	1,000 ft² GFA	20,000	AM	1.16	23	86%	14%	20	3	
				PM	1.15	23	16%	84%	4	19	
TOTAL				AM		85			43	42	
				PM		152			72	80	
8	Multifamily Housing (Mid-Rise) (221)	Dwelling Unit	120	AM	0.36	43	26%	74%	11	32	
				PM	0.44	53	61%	39%	32	21	
	Shopping Centre (820)	1,000 ft² GFA	15,000	AM	0.94	14	62%	38%	9	5	
				PM	3.81	57	48%	52%	27	30	
	General Office Building (710)	1,000 ft² GFA	15,000	AM	1.16	17	86%	14%	15	2	
				PM	1.15	17	16%	84%	3	14	
TOTAL				AM		74			35	39	
				PM		127			62	65	
TOTAL				AM		255			129	126	
				PM		445			210	234	

In total, the associated five future developments will generate an additional **255** and **445** two-way vehicle trips during AM and PM peak hours, respectively.

Based on land use data, it is assumed that destinations/origins of the generated trips from the future developments will be similar. Using the existing traffic patterns, the following destination/origin distribution assumptions are made for inbound/outbound traffic during both weekday AM and PM peak periods:

- 40% of generated trips from/to north (Lougheed Highway) through Shaughnessy Street;
- 40% from/to south through Mary Hill Road;
- 10% from/to north through Kingsway Avenue; and,
- 10% from/to south through Shaughnessy Street.

It is noted that the assignment of the generated trips would differ considering the proposed options for McAllister Avenue cross-section design.

2.3 20-Year Horizon Traffic Volumes (2039)

To determine the future traffic conditions, 20-year (2039) horizon traffic pattern was estimated. In order to consider background traffic growth that is not generated by future developments, a linear annual growth rate of 1.5% was applied to 2019 traffic volumes (i.e. 30% growth in 20 years). Existing traffic volumes with background traffic growth and development generated trips were summed to determine the combined traffic volumes for both weekday peak hours of the horizon year 2039, as shown in **Table 4**.

Table 4 20-year Horizon (2039) Estimated Traffic Volumes

Study Intersection	Eastbound			Westbound			Northbound			Southbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak													
McAllister Avenue at Shaughnessy Street	75	25	20	25	40	85	30	640	50	245	675	20	1,930
Elgin Avenue at Shaughnessy Street	RE	RE	30	RE	RE	185	RE	785	15	RE	910	115	2,040
McAllister Avenue at Mary Hill Road	35	-	160	-			180	500	-	-	280	20	1,175
Elgin Avenue at Mary Hill Road	15	-	110	-			145	310	-	-	220	55	855
PM Peak													
McAllister Avenue at Shaughnessy Street	200	45	45	45	75	210	25	925	25	165	890	30	2,680
Elgin Avenue at Shaughnessy Street	RE	RE	85	RE	RE	350	RE	1,315	20	RE	1,000	190	2,960
McAllister Avenue at Mary Hill Road	50	-	185	-			305	410	-	-	515	50	1,515
Elgin Avenue at Mary Hill Road	40	-	115	-			165	275	-	-	495	140	1,230

RE: restricted movements at Shaughnessy Street and Elgin Avenue intersection

3.0 Existing Condition Traffic Performance (2019)

3.1 Intersection Level of Service

Traffic operation performance at the key study intersections during the 2019 and 2039 weekday AM and PM peak hours were analyzed using *Synchro Version 9*, which is based on the standard methods of the *Highway Capacity Manual (HCM)*. In *HCM*, measures of effectiveness were developed including control delay (second per vehicle) and Level of Service (LOS), which is defined based on the average control delay

For capacity analysis in urban areas, LOS D or better is generally considered as acceptable LOS for both signalized and unsignalized intersections. Capacity improvement measures could be considered for intersections and/or individual movements that are operating at LOS E or F. For the signalized intersection of Shaughnessy Street and McAllister Avenue, the existing signal timing plans were provided by the City and the signal timing was optimized for future traffic operation analysis.

Based on the analysis, it is expected that all study intersections are currently operating at an acceptable LOS (LOS D or better) during both weekday peak hours. No critical movements were found for the weekday AM peak. While, during the PM peak, the westbound right-turn at Shaughnessy Street and Elgin Avenue was determined to experience long delay (LOS F), which is due to limited opportunity for the vehicles to find a safe crossing gap to turn onto Shaughnessy Street with high through traffic volumes. The overall intersection and individual movement performance of study intersections for both 2019 weekday AM and PM peak hours are shown in **Table 5**.

Table 5 2019 Peak Hour Traffic Operation Results (Existing Condition) at Study Intersections

Study Intersection (Control Type)	Peak Hour	Average Delay [second per vehicle]	LOS	Critical Movement (LOS)
McAllister Avenue at Shaughnessy Street (signalized)	AM	11.1	B	-
	PM	19.4	B	-
Elgin Avenue at Shaughnessy Street (stop-controlled)	AM	1.4	A	-
	PM	25.8	D	Westbound Right-turn (F)
McAllister Avenue at Mary Hill Road (stop-controlled)	AM	3.2	A	-
	PM	4.3	A	-
Elgin Avenue at Mary Hill Road (stop-controlled)	AM	2.7	A	-
	PM	2.4	A	-

Red: Level of Service E or F

To improve the traffic operation at Shaughnessy Street and Elgin Avenue intersection, the installation of a traffic signal was considered to provide more crossing gaps to the side street traffic (particularly westbound right-turn) and reduce conflicts with the through traffic and crossing pedestrians. The signal warrant and traffic operation analysis results are discussed in **Section 5**.

3.2 Queue Length Analysis

Queue length analysis was conducted using *SimTraffic* (traffic micro-simulation of *Synchro*) for the existing condition (2019) to determine whether the existing storage lengths are adequate. During both peak hours, the southbound left-turn 95th percentile vehicle queue at Shaughnessy Street and McAllister Avenue intersection was longer than the available storage length. No other queuing issues were found during the AM peak hour, while in the PM peak, the northbound and southbound through vehicle queues at Shaughnessy Street and McAllister Avenue intersection could spill over to the upstream intersections.

4.0 Proposed McAllister Avenue Cross-section Options

It is understood that four options be reviewed for future McAllister Avenue cross-section, between Shaughnessy Street and Mary Hill Road, including:

1) Option 1 – Two-way, Two-sided Parallel Parking

To keep the existing travel lanes, provide a multi-use path on the south side, a sidewalk on the north side, and parallel parking on both sides, as shown in **Figure 3 & 4**.

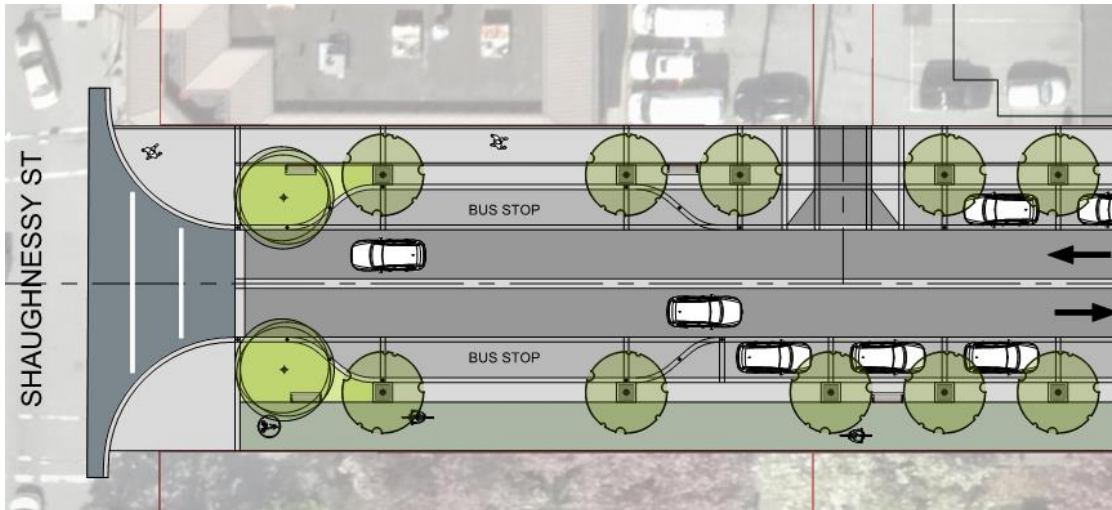


Figure 3 Typical layout of MUP on South Side and Parallel Parking on Both Sides

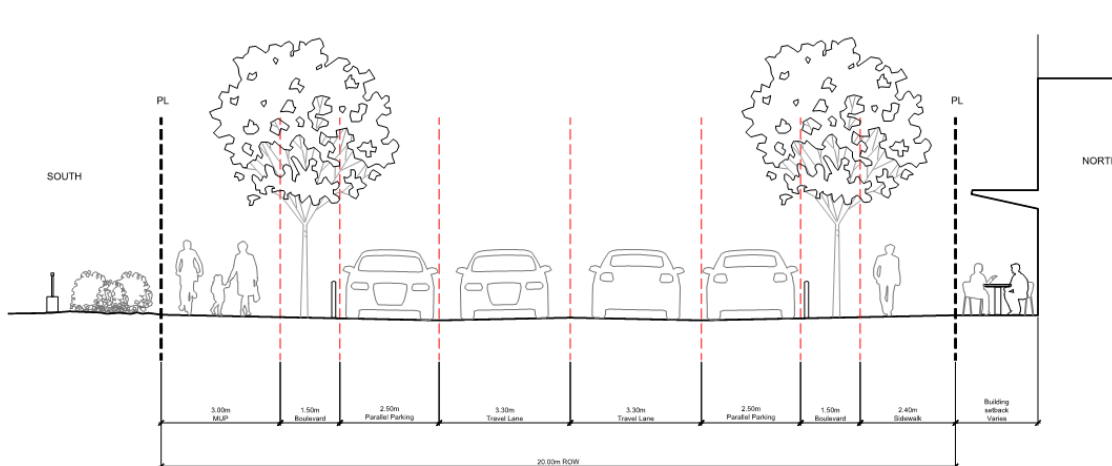


Figure 4 Cross-Section with MUP on South Side and Parallel Parking on Both Sides

2) Option 2 – One-way (eastbound), One-sided Angled Parking

To reduce the number of travel lanes from two lanes to one lane and only in eastbound direction (from Shaughnessy Street to Mary Hill Road), provide a multi-use path on the south side, a sidewalk on the north side, and angled parking on the north side, as shown in **Figure 5 & 6**.

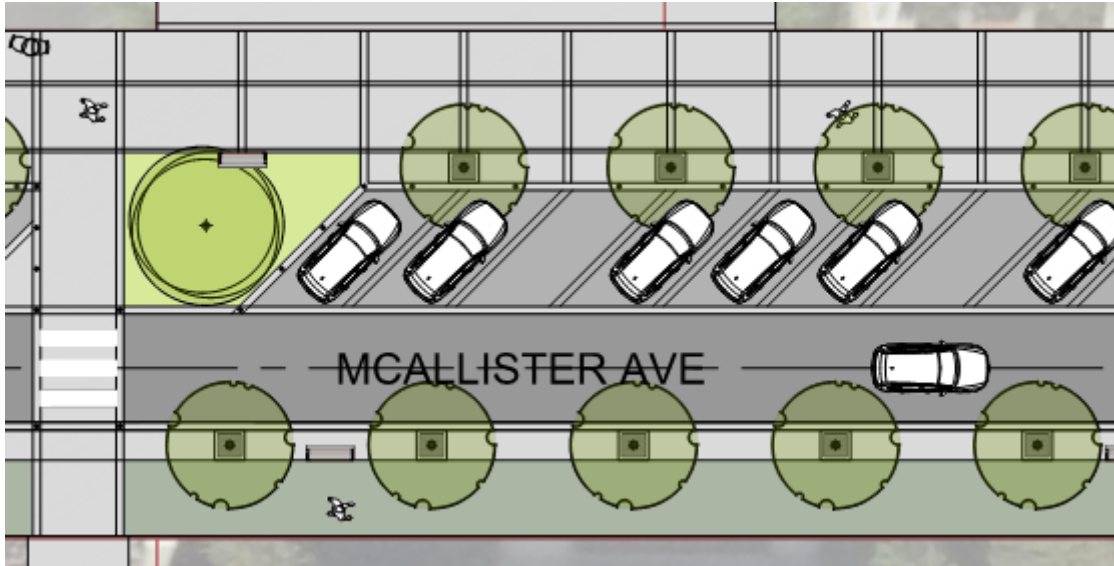


Figure 5 Typical layout of travel lane (Eastbound), MUP on South Side and Angled Parking on North Side

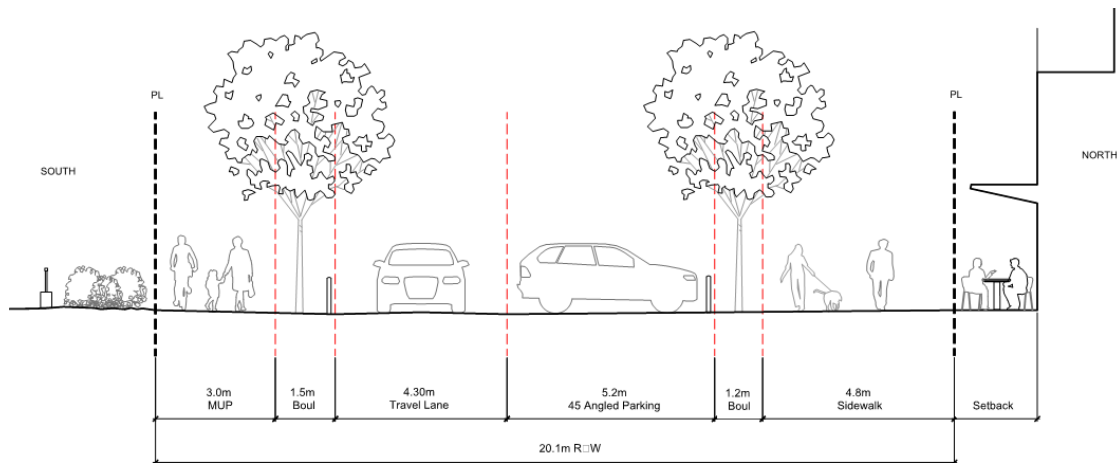


Figure 6 Typical Section of 1 travel lane (Eastbound), MUP and Angled Parking

3) Option 3 – One-way (eastbound), One-sided Angled, One-sided Parallel Parking

To reduce the number of travel lanes from two lanes to one lane and only in eastbound direction (from Shaughnessy Street to Mary Hill Road), provide a multi-use path on the south side, a sidewalk on the north side, a parallel parking on the south side, and angled parking on the north side, as shown in **Figure 7 & 8**.

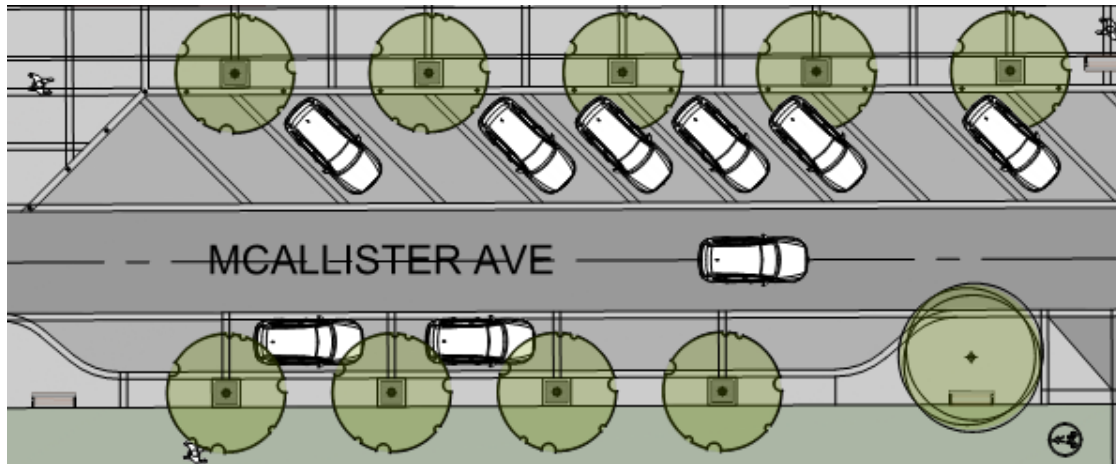


Figure 7 Typical layout of travel lane (Eastbound), MUP and parallel on South Side and Angled Parking on North Side

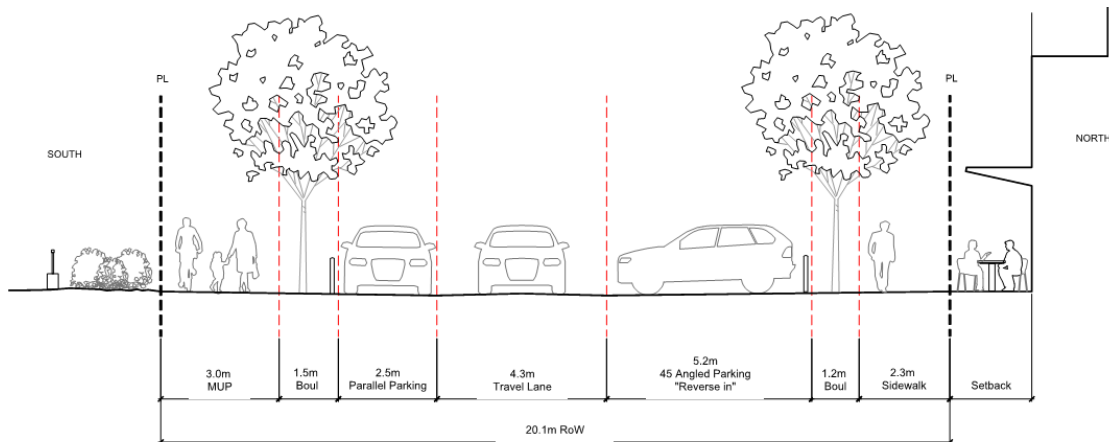


Figure 8 Typical section with One-way Travel Lane (Eastbound), MUP, Parallel Parking and Angled Parking on North Side

4) Option 4 – Two-way, One-sided Angled Parking

To keep the existing travel lanes, provide a multi-use path on the south side, a sidewalk on the north side, and angled parking on the north side, as shown in **Figure 9 & 10**.

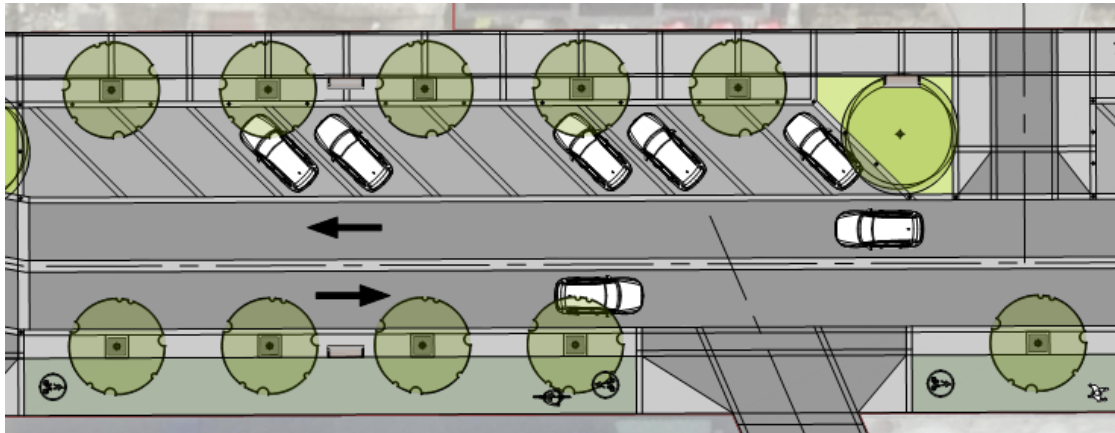


Figure 9 Typical layout of Two-way Travel Lane, MUP on South Side and Angled Parking on North Side

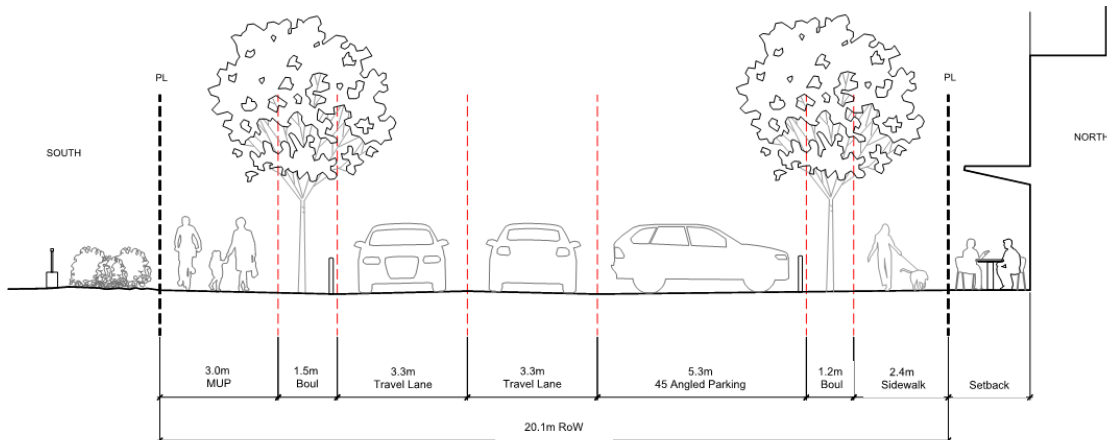


Figure 10 Typical Section with Two-way Travel Lane, MUP on South Side and Angled Parking on North Side

Since parking arrangement and pedestrian crossings have no significant impacts to intersection capacity analysis, only two cross-section options were assessed and compared with each other: two-way – existing lane configurations (**Options 1** and **4**) and one-way eastbound from Shaughnessy Street to Mary Hill Road (**Options 2** and **3**). Traffic operation analysis was carried out to assess the feasibility of the proposed options for 2039 projected traffic demands.

4.1 Options 1 and 4 – Two-way McAllister Avenue

As shown in **Figures 3 and 9**, the number of travel lanes and lane configurations will be similar to the existing condition. During the AM peak, all intersections will operate at an acceptable level of service (LOS A or B), and no critical movements were identified. During the PM peak, Shaughnessy Street and McAllister Avenue intersection will still operate at an acceptable overall level of service (LOS D); however, the eastbound left-turn will operate poorly (LOS F). Similar to the existing condition (2019), the westbound right turn movement at Shaughnessy Street and Elgin Avenue intersection will experience excessive delays due to high through traffic volumes on Shaughnessy Street. Likewise, at Mary Hill Road and McAllister Avenue intersection, the eastbound left/right turn vehicles will have difficulties to find a sufficient crossing gap to turn onto Mary Hill Road (LOS F).

The 2039 traffic operation results are summarized and compared with the 2019 results in **Table 6**.

Table 6 2039 Peak Hour Traffic Operation Results (Two-way McAllister Avenue) at Study Intersections

Study Intersection	Peak Hour	Scenario					
		2019 - Existing Lane Configuration			2039 - Option 1/4 (Existing Lane Configuration)		
		Average Delay [second per vehicle]	LOS	Critical Movement (LOS)	Average Delay [second per vehicle]	LOS	Critical Movement (LOS)
McAllister Avenue at Shaughnessy Street	AM	11.1	B	-	15.6	B	-
	PM	19.4	B	-	40.6	D	Eastbound Left-turn (F)
Elgin Avenue at Shaughnessy Street	AM	1.4	A	-	3.1	A	-
	PM	25.8	D	Westbound Right-turn (F)	1182.0	F	Westbound Right-turn (F)
McAllister Avenue at Mary Hill Road	AM	3.2	A	-	5.8	A	-
	PM	4.3	A	-	37.1	E	Eastbound Left/Right Turn (F)
Elgin Avenue at Mary Hill Road	AM	2.7	A	-	3.7	A	-
	PM	2.4	A	-	5.6	A	-

Red: Level of Service E or F

During the PM peak, queuing analysis identified long vehicle queues for side street approaches at the stop-controlled intersections due to excessive delays to turn onto the major roads (Shaughnessy Street and Mary Hill Road). It is expected that there will be queue spillovers for the eastbound approach at Mary Hill Road and McAllister Avenue and westbound approach at Shaughnessy Street and Elgin Avenue. In addition, long queues will be formed in the northbound direction on Mary Hill Road due to vehicles turning left onto Elgin Avenue.

4.2 Options 2 and 3 – One-way McAllister Avenue (Eastbound)

As shown in **Figures 5 and 7**, the number of travel lanes will be reduced from two to one, and no westbound traffic will be allowed from Mary Hill Road to Shaughnessy Street. In other words, the northbound left-turn and southbound right-turn movements at McAllister Avenue and Mary Hill Road intersection are restricted. As a result, vehicle traffic for the restricted movements will use other roads in the study area and the intersections of McAllister Avenue with Shaughnessy Street and Mary Hill Road will become less congested. While, the Mary Hill Road and Elgin Avenue intersection will have higher total entering traffic volumes. The 2039 redistributed traffic volumes are shown in **Table 7**.

Table 7 20-year Horizon (2039) Estimated Traffic Volumes (One-way McAllister Avenue) at Study Intersections

Study Intersection	Eastbound			Westbound			Northbound			Southbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM Peak													
McAllister Avenue at Shaughnessy Street	75	35	20	RE			65	645	90	245	675	20	1,870
Elgin Avenue at Shaughnessy Street	RE	RE	30	RE	RE	270	RE	700	15	RE	910	115	2,040
McAllister Avenue at Mary Hill Road	35	-	185	-			RE	585	-	-	280	RE	1,085
Elgin Avenue at Mary Hill Road	15	-	110	-			230	310	-	-	200	55	920
PM Peak													
McAllister Avenue at Shaughnessy Street	200	70	45	RE			100	925	70	165	890	30	2,495
Elgin Avenue at Shaughnessy Street	RE	RE	85	RE	RE	560	RE	1,105	20	RE	1,000	190	2,960
McAllister Avenue at Mary Hill Road	50	-	230	-			RE	620	-	-	515	RE	1,415
Elgin Avenue at Mary Hill Road	40	-	115	-			375	275	-	-	445	140	1,390

RE: restricted movements

Based on traffic analysis (**Table 8**), the following changes were identified in terms of intersection overall and individual movement level of service:

- PM peak – At Mary Hill Road and McAllister Avenue, the intersection overall LOS will be improved from LOS F to A. However, at Mary Hill Road and Elgin Avenue, the eastbound left/right turn movements will become critical (LOS F), due to higher traffic volumes on Mary Hill Road.

In terms of the queuing analysis, similar issues were identified for one-way McAllister Avenue options, which means that the proposed cross-section designs have minimal relations on the spillover issues and long experienced delays at the stop-controlled intersections.

Table 8 2039 Peak Hour Traffic Operation Results (One-way McAllister Avenue) at Study Intersections

Study Intersection	Peak Hour	Scenario					
		2019 - Existing Lane Configuration			2039 - Option 2/3 (One-way McAllister Avenue EB)		
		Average Delay [second per vehicle]	LOS	Critical Movement (LOS)	Average Delay [second per vehicle]	LOS	Critical Movement (LOS)
McAllister Avenue at Shaughnessy Street	AM	11.1	B	-	15.9	B	-
	PM	19.4	B	-	38.7	D	Eastbound Left-turn (E)
Elgin Avenue at Shaughnessy Street	AM	1.4	A	-	4.9	A	-
	PM	25.8	D	Westbound Right-turn (F)	1893.2	F	Westbound Right-turn (F)
McAllister Avenue at Mary Hill Road	AM	3.2	A	-	3.3	A	-
	PM	4.3	A	-	8.5	A	Eastbound Left/Right Turn (E)
Elgin Avenue at Mary Hill Road	AM	2.7	A	-	4.6	A	-
	PM	2.4	A	-	16.6	C	Eastbound Left/Right Turn (F)

Red: Level of Service E or F

5.0 Potential Improvement Measures

The latest *Traffic Signal and Pedestrian Signal Head Warrant Handbook* from TAC (TAC Warrant) was used to determine whether a traffic signal is warranted for the Shaughnessy Street and Elgin Avenue intersection. The TAC Warrant uses cumulative factors methodology that considers turning conflicts (vehicle-vehicle and vehicle-pedestrian) plus various intersection characteristics and local demographic factors. The warrant analysis requires two hours each for morning, midday, and afternoon peak periods to calculate an average hourly volume. The warrant score of 100 is the threshold for traffic signal installation.

Based on the 2019 modified traffic volumes, the analysis results showed that the intersection is marginally warranted for a full traffic signal as the score is 100. Using the 2029 traffic volumes, with the development traffic, the signal warrant score was found to be 167, indicating that the traffic signal is required.

Traffic operation analysis was undertaken considering the installation of traffic signal. It was assumed that the signal is coordinated with the upstream signal at McAllister Avenue during the PM peak. While, during the AM peak, due to acceptable traffic operation performance, coordination is not required.

The results are summarized and compared with the existing condition in **Table 9**.

Table 9 2019 Peak Hour Traffic Operation Results Comparison at Shaughnessy Street and Elgin Avenue Intersection

Peak Hour	Control Type	Level of Service [Average Delay, seconds per vehicle]				
		Eastbound	Westbound	Northbound	Southbound	Intersection Overall
AM	stop-controlled	B [14.2]	C [15.7]	A [0]	A [0]	A [1.4]
	signalized	A [0.1]	A [5.6]	A [7.3]	A [5.9]	A [6.4]
PM	stop-controlled	C [17.5]	F [230.8]	A [0]	A [0]	D [25.8]
	signalized	A [0.5]	F [81.0]	C [31.4]	A [9.9]	C [27.6]

The intersection operates at an acceptable level of service during the AM peak for both cases (stop-controlled and signalized). In the PM peak, the level of service for the westbound right-turn movement will remain the same (LOS F); however, the average vehicle delay will be decreased by 65% (from 230.8 to 81.0 seconds). The northbound vehicle queue could spill over to the McAllister Avenue intersection. Overall, the installation of traffic signal could be more beneficial during the PM peak.

On Mary Hill Road, long vehicle queues were identified for all options. It was determined that the provision of left-turn bays on northbound direction will allow the through traffic pass the left-turning vehicles to McAllister Avenue (Options 1 and 4) and Elgin Avenue (all options). Hence, the vehicle average delay will be reduced for McAllister Avenue northbound vehicles.

6.0 Summary and Conclusions

Traffic operation analysis of four intersections in the vicinity of McAllister Avenue, between Shaughnessy Street and Mary Hill Road for the existing condition (2019) and proposed laning configurations for the projected 2039 (20-year horizon) traffic demands were reviewed.

The intersection capacity analysis results indicated that, for the 2019 traffic conditions, the study intersections are experiencing an acceptable condition (LOS D or better) during weekday AM and PM peak hours. Queue length analysis was also conducted and indicated that there are generally no existing storage capacity deficiencies. At Shaughnessy Street and McAllister Avenue intersection, spillover issues may occur for the southbound left-turn movements during both peak hours and for the northbound / southbound through movements during the PM peak hour.

The traffic operation of the proposed cross-section design options, **Options 1 and 4** (Two-way McAllister Avenue) and **Options 2 and 3** (One-way Eastbound McAllister Avenue from Shaughnessy Street to Mary Hill Road) were analyzed for 20-year horizon traffic demands. Based on the results, for both options, the major issues were determined to be long delays and hence long vehicle queues for vehicles turning from the side streets, McAllister Avenue and Elgin Avenue, onto the major roads, Shaughnessy Street and Mary Hill Road, due to high through traffic volumes on major roads. In other words, the identified operational issues are not due to the implementation of proposed options for McAllister Avenue cross-section. However, overall, the traffic operation performance of the study intersections will be better with two-way McAllister Avenue options (**Options 1 and 4**).

To further improve the traffic operation performance at the Shaughnessy Street and Elgin Avenue intersection, the installation of a traffic signal was considered. Signal warrant analysis was conducted and the results showed that a full traffic signal is warranted in 2019 and 2029. The peak hour traffic operation analysis indicated that during the PM peak, the average delay experienced by westbound right-turn vehicles was significantly decreased, while the northbound queue might spill over further upstream to McAllister Avenue. Overall, the installation of traffic signal could be more beneficial during the PM peak.

It was also determined that to alleviate the queuing issues on Mary Hill Road, the provision of left-turn bays on northbound direction could be considered at McAllister Avenue (Options 1 and 4) and Elgin Avenue (all options).

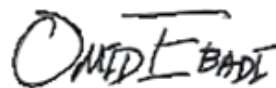
The main focus of the report ISL was to review the traffic capacities. However, it should be noted that there are other factors that should be considered when changing the traffic patterns. Most businesses want unrestricted access to their commercial space, in McAllister's circumstances this would translate to a 2-way roadway with access to parking. Commercial areas request these conditions, as it helps to generate additional customers to their business. ISL would recommend that the City consult with the developer prior to making an ultimate decision on the typical road cross section.

If there are any questions or further information is required, please do not hesitate to contact the undersigned.

Yours truly,



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