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TO:	Arun Singh, P. Eng.	DATE:	November 29, 2010
FROM:	GENIVAR	PROJECT NO.:	OT-08-025-00-OT
PROJECT:	Johnston Road Land Use Study	TASK / WBS NO:	
SUBJECT:	Transportation Study – Forecast Analysis		

Johnston Road Land Use Study – Transportation Study Forecast Analysis

BACKGROUND

GENIVAR submitted the Johnston Road Land Use Study's *Transportation Study Report* final version on June 2nd, 2010. This report was completed based on a revision of the draft report (December 5th, 2009) as per the action item inclusions in the comment response memorandum submitted on April 12th, 2010.

Section 7.0 of the final Transportation Study Report included a high level traffic forecast of the for the preferred land use concept and Section 8.0 provides a summary of transportation considerations to be carried forward to the site plan stage of the planning process.

As per the request of City staff, this technical memorandum is to provide a summary of a more detailed forecast analysis assuming that the land use approximations included in the Transportation Study Report are carried forward. **Table 1** below indicates the resulting trip generation estimate for the morning and afternoon peak hours of travel demand.

Table 1
Preferred Land Use Concept – Summary of Trip Assignment

Preliminary Alternative Concept	Land Use Designation (New Traffic Generators)	Trips					
		AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
Preferred Concept	Automobile	2,816	2,422	394	2,708	474	2,234
	Transit	1,482	1,275	207	1,425	249	1,176
	Walking	494	425	69	475	83	392
	Cycling	148	127	21	143	25	118
	TOTAL	4,940	4,249	692	4,751	831	3,920

Source: Table 12. Johnston Road Land Use – Transportation Study Report.

The following sections present a summary of the additional forecast analysis and resulting modifications needed.

TRAFFIC VOLUME FORECAST

Initially, forecast traffic was assigned based on high level travel distribution assumptions outlined in Table 12 of the Transportation Study Report which assumed that:

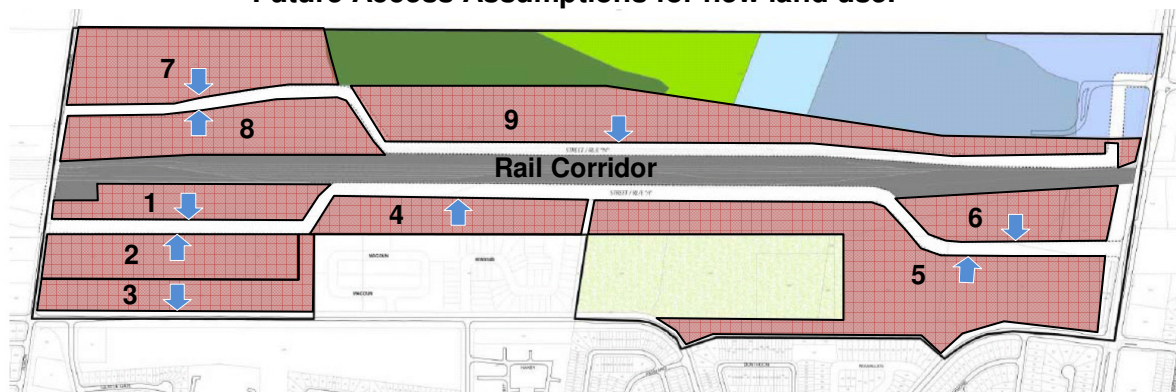
- Traffic to / from the west would split between Albion Road and Bank Street (50% / 50%); and

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- Traffic to / from the east would split between Johnston Road and the future east-west access road north of Johnston Road (75% / 25%).

For the purposes of this detailed analysis, assignment of traffic to the adjacent network was approximated by dividing the future development area into smaller land use 'blocks'. It was assumed that general access to each land use block would be as indicated in **Figure 1** (the analysis does not require specific locations of access to be defined at this time). In summary, it was assumed that 5 of the 9 land use blocks indicated in the figure would be provided access via the future east-west collector south of the rail corridor, 1 block would be provided access directly to Johnston Road, and 3 of the 9 blocks would be provided access to a new east-west roadway north of the rail corridor. **Attachment 1** contains the 'block' distribution assumptions and **Attachment 2** includes all forecast worksheets.

Figure 1
Future Access Assumptions for new land use.

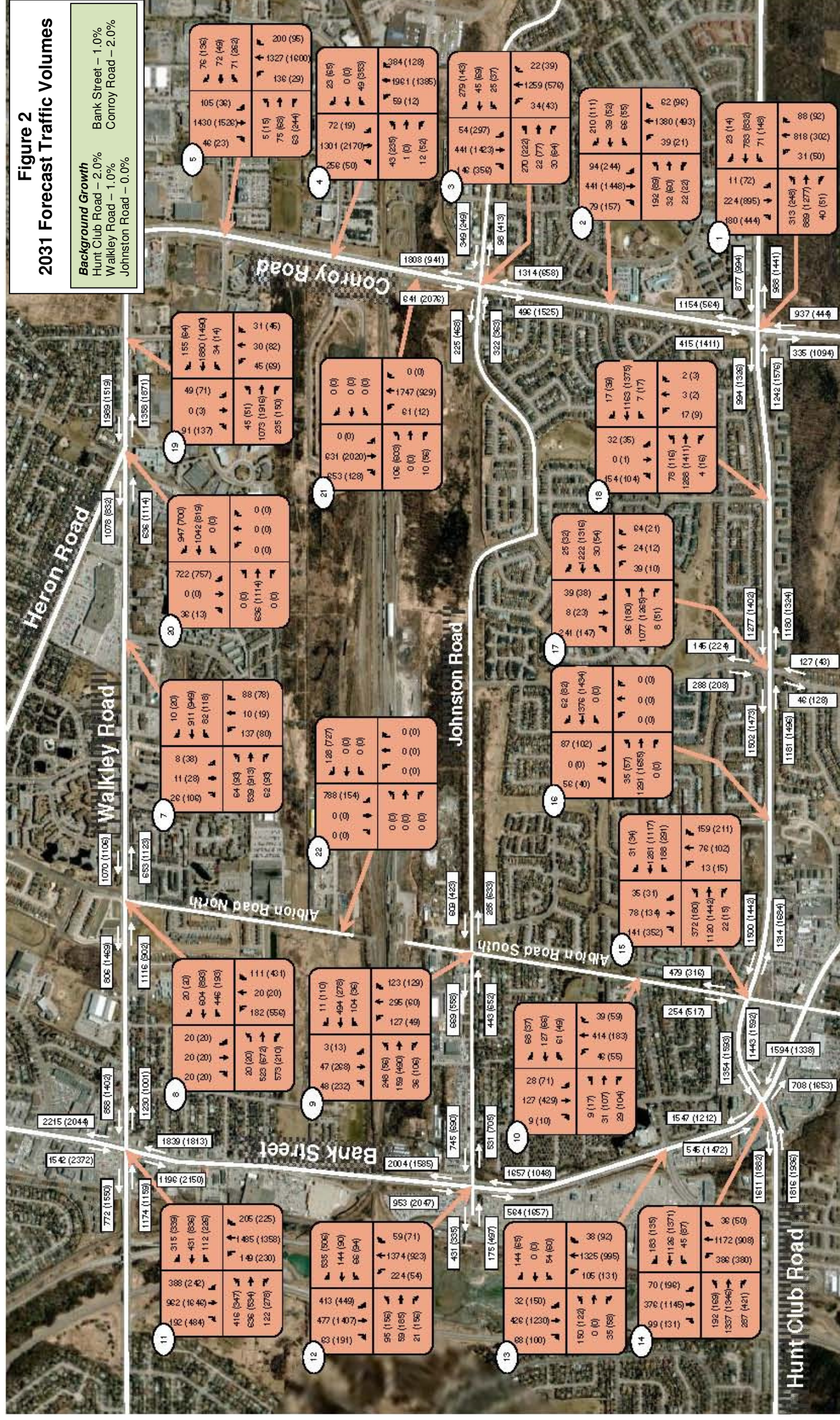


Note: The inclusions in this figure are assumed and may change as the site plan stage.

Based on the above, **Figure 2** presents the 2031 forecast traffic volumes (includes both site generated traffic and annual background growth traffic). Annual background growth factors were assumed as follows:

- *Hunt Club Road* – 2% (Cross-Town growth assumed to generate a 2% annual background growth rate)
- *Bank Street* – 1% (growth in south will utilize alternative corridors such as Limebank)
- *Walkley Road* – 1% (Mature development along this corridor, external growth assumed to utilize Hunt Club Road)
- *Conroy Road* – 2% (Growth south of Hunt Club Road will increase traffic along the Conroy Road corridor)
- *Johnston Road* – 0% (no growth expected along Johnston Road from external development)

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FORECAST ANALYSIS RESULTS

An analysis was conducted to determine the forecast levels of service as a result of increased traffic from both the fully built Johnston Road site as well as annual background growth in traffic from future land use growth beyond the study area.

Table 2 presents the intersection capacity analysis results for forecast conditions under the existing signal timing and lane configurations.

Table 2
Intersection Capacity Analysis – 2031 Forecast
Existing Signal Timing and Lane Configurations

ID No.	Intersection		Performance Characteristics									
	North-South	East-West	Overall				Critical Movement					
			V/C ¹		LOS ²		Movement		V/C ¹		LOS ²	
Signalized			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Conroy Road	Hunt Club Road	0.88	0.91	B	E	NBT	EBT/R	0.88	1.07	D	F
2	Conroy Road	Lorry Greenberg Drive	0.87	0.61	D	B	EBL	EBL	0.96	0.67	E	B
3	Conroy Road	Johnston Road	0.66	0.67	B	B	EBL	EBL	0.78	0.70	C	C
4	Conroy Road	Thurston Drive	0.77	1.03	C	F	SBL	WBL	0.83	1.13	D	F
5	Conroy Road	St. Laurent Boulevard	0.65	0.74	B	C	NBL	WBL	0.68	0.77	B	C
7	Heatherington Road	Walkley Road	0.48	0.51	A	A	NBL	WBT	0.53	0.52	A	A
8	Albion Road North	Walkley Road	0.88	0.97	D	E	WBL	NBL	0.90	0.98	E	E
11	Bank Street	Walkley Road	0.91	1.15	E	F	SBL	WBT	1.99	1.33	F	F
12	Bank Street	Johnston Road	1.38	0.89	F	D	SBL	SBL	1.55	0.94	F	E
13	Bank Street	Cahill Drive	0.55	0.55	A	A	EBL	SBT	0.63	0.57	B	A
14	Bank Street	Hunt Club Road	1.01	1.19	F	F	WBT	WBT	1.27	1.52	F	F
15	Albion Road	Hunt Club Road	1.08	1.02	F	F	EBL	SBT/R	1.18	1.06	F	F
16	Cahill Drive	Hunt Club Road	0.54	0.66	A	B	WBT	EBT	0.54	0.68	A	B
17	Lorry Greenberg Drive	Hunt Club Road	0.58	0.62	A	B	SBT/R	WBT/R	0.71	0.74	C	C
18	Pike Street	Hunt Club Road	0.53	0.68	A	B	SBL/T/R	EBL	0.54	0.73	A	C
19	Don Reid Drive	Walkley Road	0.77	0.80	C	D	WBT/R	EBT/R	0.80	0.84	D	D
20	Heron Road	Walkley Road	0.63	0.64	B	B	WBT	EBT	0.67	0.70	B	C
21	Conroy Road	E-W Collector (S of Rail Corridor)	0.69	1.06	B	F	NBT	SBT	0.89	1.06	D	F
Unsignalized			Delay (s) ³		LOS ²		Movement		Delay (s) ³		LOS ²	
9	Albion Road South	Johnston Road	157.6	203.9	F	F	WB	EB	229.4	350.6	E	F
10	Albion Road South	Cahill Drive	20.9	32.3	B	D	NB	SB	28.6	52.4	B	F

NOTE: Existing Signal Timing Systems and Lane Configurations

NOTE: Intersection 8 was assessed based on an optimized signal timing plan (existing phases) with an assumed 60 inbound and 60 outbound on the north leg.

1. Volume to Capacity Ratio (V/C) – compares intersection approach volumes with approach capacity (0.50 – at half capacity, 1.00 – at capacity).

2. Level of Service (LOS) – Intersection Performance Rating (A – excellent conditions, F – congested conditions).

3. Average delay in seconds – average delay experienced by drivers at intersection

Attachment 3 contains the intersection capacity analysis reports.

In summary, a number of intersections are projected to experience congestion under forecast traffic levels. This includes:

- Conroy / Hunt Club
- Conroy / Thurston
- Albion North / Walkley
- Bank / Walkley
- Bank / Johnston
- Bank / Hunt Club
- Albion South / Hunt Club
- Albion South / Johnston

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RECOMMENDED IMPROVEMENTS BASED ON FORECAST ANALYSIS

An iterative approach was taken to determine the appropriate modifications required to service forecast traffic levels starting with minor intersection adjustments (i.e. signal timing optimization and / or new protective signal phasing for turn movements) and moving to more significant improvements where required (i.e. auxiliary lane implementation to roadway widening to accommodate additional through lanes). This was done for both the AM and PM peak hours of forecast travel demand.

Table 3 provides an overview of the improvements required at each intersection as well as the resulting LOS. The rightmost column of the table “*Intersection Improvements Required to Accommodate Forecast Traffic (includes Annual Background Growth and Site Traffic)*”, indicates what improvements from the existing configuration would be required to service the AM peak hour volumes and the PM peak hour volumes separately. As such, the more significant of the two would be the required solution.

Table 3
Intersection Capacity Analysis – 2031 Forecast
Optimized Signal Timing and Improved Lane Configurations

ID/No.	Intersection		Performance Characteristics										Intersection Improvements Required to Accommodate Forecast Traffic (includes Annual Background Growth and Site Traffic)	
	North-South	East-West	Overall				Critical Movement						AM	PM
	Signalized		V/C ¹		LOS ²		Movement		V/C ¹		LOS ²			
AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM			
1	Conroy Road	Hunt Club Road	0.68	0.82	B	D	NBT	EBT/R	0.89	0.90	D	E		Lane Configuration Upgrade (add storage to EBL and WBL)
2	Conroy Road	Lorry Greenberg Drive	0.77	0.61	C	B	NBT	EBL	0.82	0.67	D	B	Optimize signal timing	
3	Conroy Road	Johnston Road	0.66	0.67	B	B	EBL	EBL	0.78	0.70	C	C		
4	Conroy Road	Thurston Drive	0.77	0.84	C	D	SBL	EBL	0.83	0.89	D	D	Optimize signal timing	Lane Configuration Upgrade (Add SBT lane)
5	Conroy Road	St. Laurent Boulevard	0.65	0.74	B	C	NBL	WBL	0.68	0.77	B	C		
7	Heatherington Road	Walkley Road	0.48	0.51	A	A	NBL	WBT	0.53	0.52	A	A		
8	Albion Road North	Walkley Road	0.88	0.72	D	C	WBL	WBL	0.90	0.86	E	D	Optimize signal timing	Lane Configuration Upgrade (3-lane NB Approach - NBL, NBT/L, and NBR)
9	Albion Road South	Johnston Road	0.81	0.75	D	C	EBL	EBT/R	0.81	0.77	D	C	Traffic signals and exclusive auxiliary lanes for each approach.	Traffic signals and exclusive auxiliary lanes for each approach.
11	Bank Street	Walkley Road	0.82	0.80	D	D	SBL & EBL	EBL	0.89	0.87	D	D	Optimize signal timing	Lane Configuration Upgrade (Widen EB, WB, and SB approaches by 1 lane for EBT, WBT, SBT. Also add double NBL)
12	Bank Street	Johnston Road	0.86	0.81	D	D	NBT & SBL	SBL	0.90	0.89	E	D	Optimize signal timing	Optimize signal timing
13	Bank Street	Cahill Drive	0.55	0.55	A	A	EBL	SBT	0.63	0.57	B	A		
14	Bank Street	Hunt Club Road	0.85	0.87	D	D	NBT	WBT	0.89	0.88	D	D	Lane Configuration Upgrade (Widen Hunt Club to 6 lanes)	Lane Configuration Upgrade (Widen both Hunt Club and Bank to 6 lanes)
15	Albion Road	Hunt Club Road	0.84	0.84	D	D	EBL	WBL	0.88	0.88	D	D	Optimize signal timing	Lane Configuration Upgrade (Add SBR auxiliary lane)
16	Cahill Drive	Hunt Club Road	0.54	0.66	A	B	WBT	EBT	0.54	0.68	A	B		
17	Lorry Greenberg Drive	Hunt Club Road	0.58	0.62	A	B	SBT/R	WBT/R	0.71	0.74	C	C		
18	Pike Street	Hunt Club Road	0.55	0.68	A	B	SBL/T/R	EBL	0.54	0.73	A	C		
19	Don Reid Drive	Walkley Road	0.77	0.80	C	D	WBT/R	EBT/R	0.80	0.84	D	D		
20	Heron Road	Walkley Road	0.63	0.64	B	B	WBT	EBT	0.67	0.70	B	C		
21	Conroy Road	E-W Collector (S of Rail Corridor)	0.69	0.86	B	D	NBT	SBT	0.89	0.89	D	D	EBL, EBR, NBL, SBR Configuration	Lane Configuration Upgrade (Conroy 3 lanes in SB direction)
Unsignalized			Delay (s)³		LOS²		Movement		Delay (s)³		LOS²			
10	Albion Road	Cahill Drive	20.9	23.1	C	C	NB	SB	28.6	38.4	D	D		Lane Configuration Upgrade (add NBL and SBL) - monitor

NOTE: Existing Signal Timing Systems used where LOS 'D' or better could be maintained
 1. Volume to Capacity Ratio (V/C) – compares intersection approach volumes with approach capacity (0.50 – at half capacity, 1.00 – at capacity)
 2. Level of Service (LOS) – Intersection Performance Rating (A – excellent conditions, F – congested conditions)
 3. Average delay in seconds – average delay experienced by drivers at intersection

In summary, the following improvements would be required to allow the intersections to operate at satisfactory levels of service based on the land use and distribution assumptions carried in this study:

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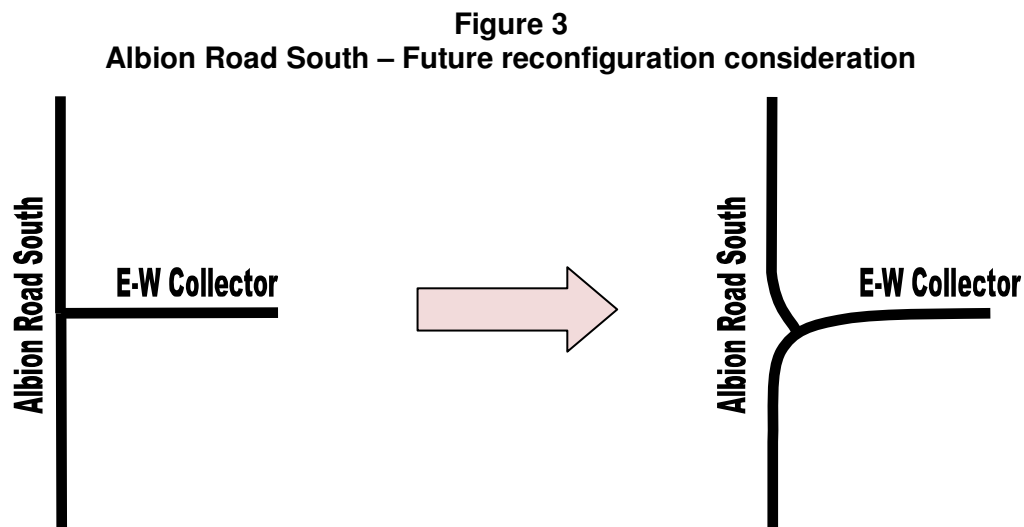
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New transportation network items needed to service the Johnston Road site to 2031

- *New East-West Collector (south of the rail corridor)* - A future 2-lane collector road extending from Albion Road South to Conroy Road between Johnston Road and the rail corridor will be required to divert the majority of site traffic away from the Johnston Road collector and mitigate impacts to the Conroy Road / Johnston Road intersection level of service.
- *Conroy Road / New East-West Collector (south of the rail corridor) intersection* – The future New East-West Collector will intersect Conroy Road and ultimately require traffic signals and a lane configuration that includes an eastbound approach with a left turn priority lane and a right turn auxiliary lane. Along Conroy Road, the southbound approach will be required to include new southbound through and right turn lanes and a northbound left turn lane.
- *Albion Road South / New East-West Collector (south of the rail corridor) intersection* – This intersection will ultimately operate more appropriately as a “T” intersection with the southbound approach stemming from a continuous Albion Road South-East-West Collector link (see **Figure 3** below).

Modifications to primary intersections in the vicinity of the Johnston Road site

- *Conroy Road / Lorry Greenberg Drive* – Optimize signal timing.
- *Conroy Road / Thurston Drive* – Modify intersection approach to include a third southbound through and egress lane.



- *Albion Road North / Walkley Road* – Modify the northbound approach to include an exclusive left turn lane, a through and left lane, and a right turn lane.

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- *Albion Road South / Johnston Road* – It was determined that forecast traffic levels could be accommodated by a single lane roundabout. The City should first undertake an exercise to compare roundabout and traffic signal options. Should traffic signals be found as the preferred solution, the intersection may be required to include auxiliary left turn lanes in each direction (capacity analysis for both roundabout and signalized intersections are included in **Attachment 3**).
- *Bank Street / Johnston Road* – Optimize signal timing.
- *Albion Road South / Cahill Drive* – This intersection may require the addition of left turn lanes in the northbound and southbound direction or the implementation of traffic signals. It is recommended that the City monitor this intersection nearing the OP horizon to determine the appropriate context of improvements (if required).

Key Intersection and Network Improvements for consideration beyond the site

While site generated impacts at major intersections along Bank Street, Conroy Road, Hunt Club Road, and Walkley Road are considered minimal, the annual background growth accumulation applied to through traffic has raised the following considerations:

Minor Intersection Considerations

- *Conroy Road / Hunt Club Road* – Modify intersection to include eastbound and westbound right turn storage and taper.
- *Albion Road South / Hunt Club Road* – Modify the southbound approach of the intersection to include a new southbound right turn lane.

Major Network Considerations

- *Bank Street / Walkley Road* – Modify the intersection to include 3 eastbound, westbound, and southbound through lanes (up from the current 2 through lanes). In addition, double northbound left turn lanes would be required. This intersection should be monitored over time to determine if these improvements would be required by 2031. Major implementations such as the Strandherd-Armstrong Bridge, Prince of Wales, and Riverside widenings may divert a component of existing and background growth traffic from the lands to the south to utilize other corridor alternatives and reduce the need for improvements along Bank Street.
- *Bank Street / Hunt Club Road* – Modify the intersection to include 3 through and egress lanes in each direction. [This should be considered during the EA for the widening of Hunt Club Road to 6-lanes as part of the TMP Phase 3 implementation.]

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Should you have any questions regarding the analysis above, please contact Mr. Christopher Gordon and / or Mr. Mark Crockford as per the contact information below:

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ATTACHMENTS:

- 1. Forecast Traffic Distribution Assumptions**
- 2. Forecast Worksheets**
- 3. Intersection Capacity Analysis Worksheets**