

City of Sault Ste. Marie

Great Northern Road/Second Line Area

Volume 1: Road Network and Access

Volume 2: Active Transportation (under separate cover)

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1. Introduction

CIMA+ Canada Inc. (CIMA) was retained by the City of Sault Ste. Marie (the City) to conduct a traffic operations review and assessment of potential issues in the area surrounding the Great Northern Road/Second Line East intersection. The existing road network is illustrated in Figure 1.

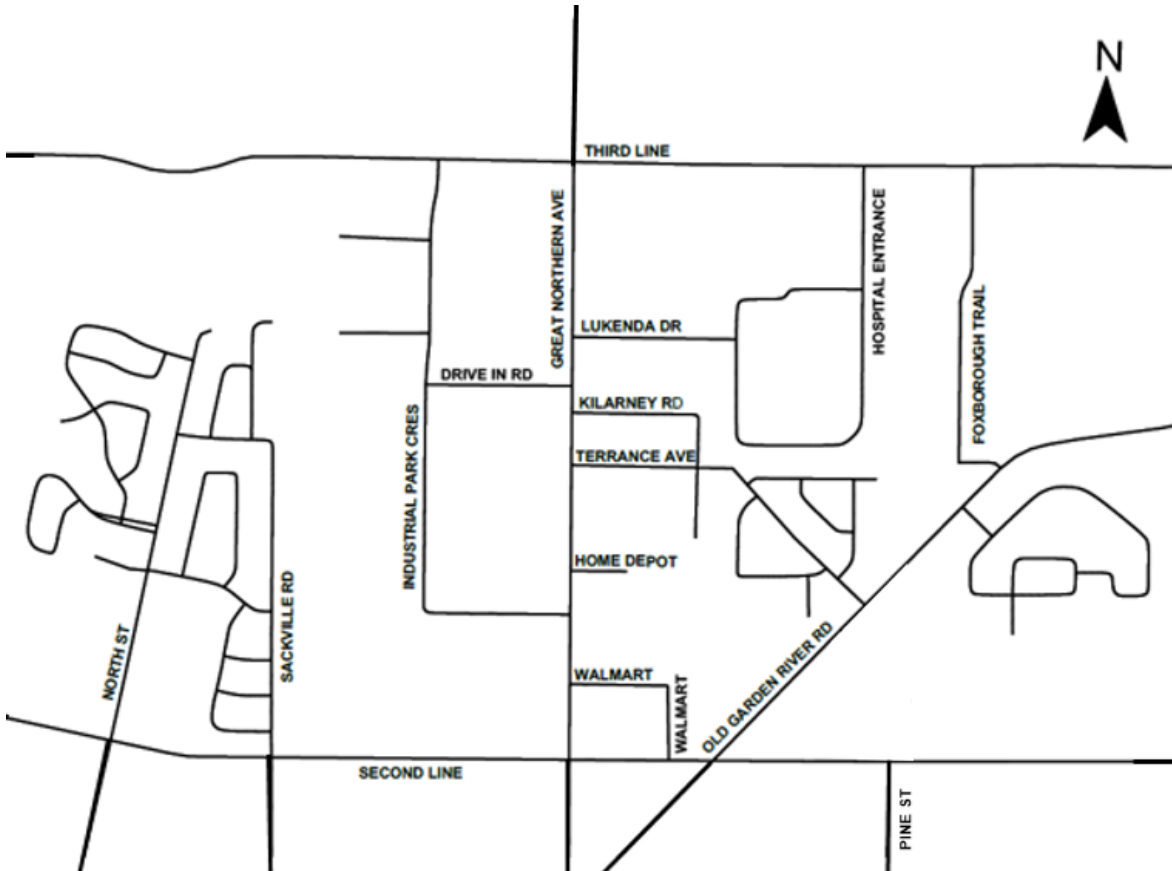


Figure 1: Existing Road Network

2. Problem and Opportunity

The traffic operations review and assessment of the study area determined that under 2017 existing and 2027 future 'do nothing' conditions, some movements were over capacity and present long delays and queues, particularly at the signalized intersections of Great Northern Road & Second Line, Second Line & Sackville Road, Second Line & Pine Street.

Signal timing improvements are able to address some of the identified issues however, some movements are likely to deteriorate in the short-term or long-term time periods, including:

Short-Term

- Left-turn movements in all directions at the intersection of Great Northern Road & Second Line, particularly queues in the northbound direction;
- Northbound left-turn at the intersection of Second Line & Pine Street;

Long-Term

- Northbound through queues at the intersection of Great Northern Road & Second Line; and

- Eastbound left-turn from the New Development Access on Great Northern Road across from the Walmart Access at Great Northern Road, unless signalized.

Turning movements for the 2027 future scenario that cannot be improved with signal timing alone are illustrated in Figure 2. Highlighted turning movements include queues that exceed available storage, turning movements between 0.85 – 1.00 v/c that should be monitored, and turning movements with a v/c greater than 1.00 in which capacity is exceeded.

The following movements are likely to require (direct or indirect) improvements considering a long-term time period:

- All turning movements at the intersection of Great Northern Road & Second Line; and
- Eastbound left-turn (if unsignalized) from the New Development Access across from the Walmart Access at Great Northern Road.

While having no capacity problems, the intersection of Old Garden River Road and Second Line presents difficulty for left-turning traffic due to the skew of the intersection. For safety reasons, TAC Geometric Guidelines suggest a skew angle between 70 and 110 degrees as being acceptable while the current configuration has a skew of 50 degrees.

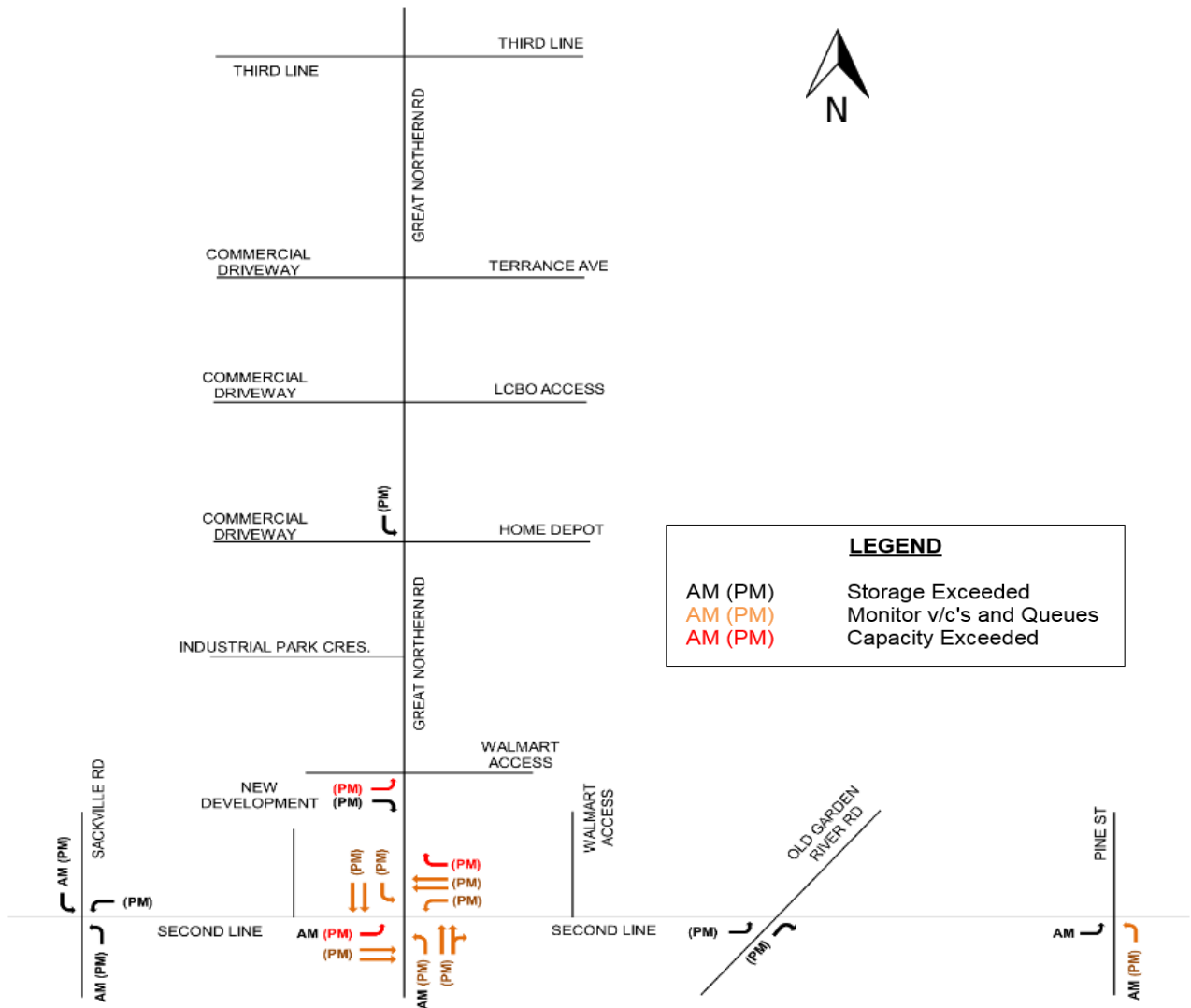


Figure 2: 2027 Future Traffic Operations – Operational Deficiencies

3. Needs and Justification

Figure 3 illustrates the main access roads for developments within the vicinity of the Great Northern Road/Second Line intersection. The majority of developments access their site through two major arterials, Great Northern Road and Second Line. The current road network gives rise to the following issues:

- There is a lack of secondary road network in this area of the City, which gives rise to operational issues on the primary network.
- There is a lack of choice for vehicles entering and exiting the primary network as they are forced to utilize either Second Line or Great Northern Road based on their location. A choice is not available in the majority of cases.
- All northbound vehicles entering the commercial and industrial areas surrounding Great Northern Road from the south end of the City must pass through the Great Northern Road and Second Line intersection.

- The high concentration of commercial driveways and high traffic volumes throughout the road network create difficulty for vehicles attempting to turn left out of major commercial development driveways along the corridors and left turning traffic at Great Northern Road and Second Line.

In order to improve traffic operations in the area alternative access routes for existing and future development access and/or bypass routes are needed to reduce congestion at this node – in short, providing a secondary road network to alleviate the primary network. A secondary issue involves the intersection of Old Garden River Road and Second Line, which presents difficulty for left-turning traffic due to the skew of the intersection.

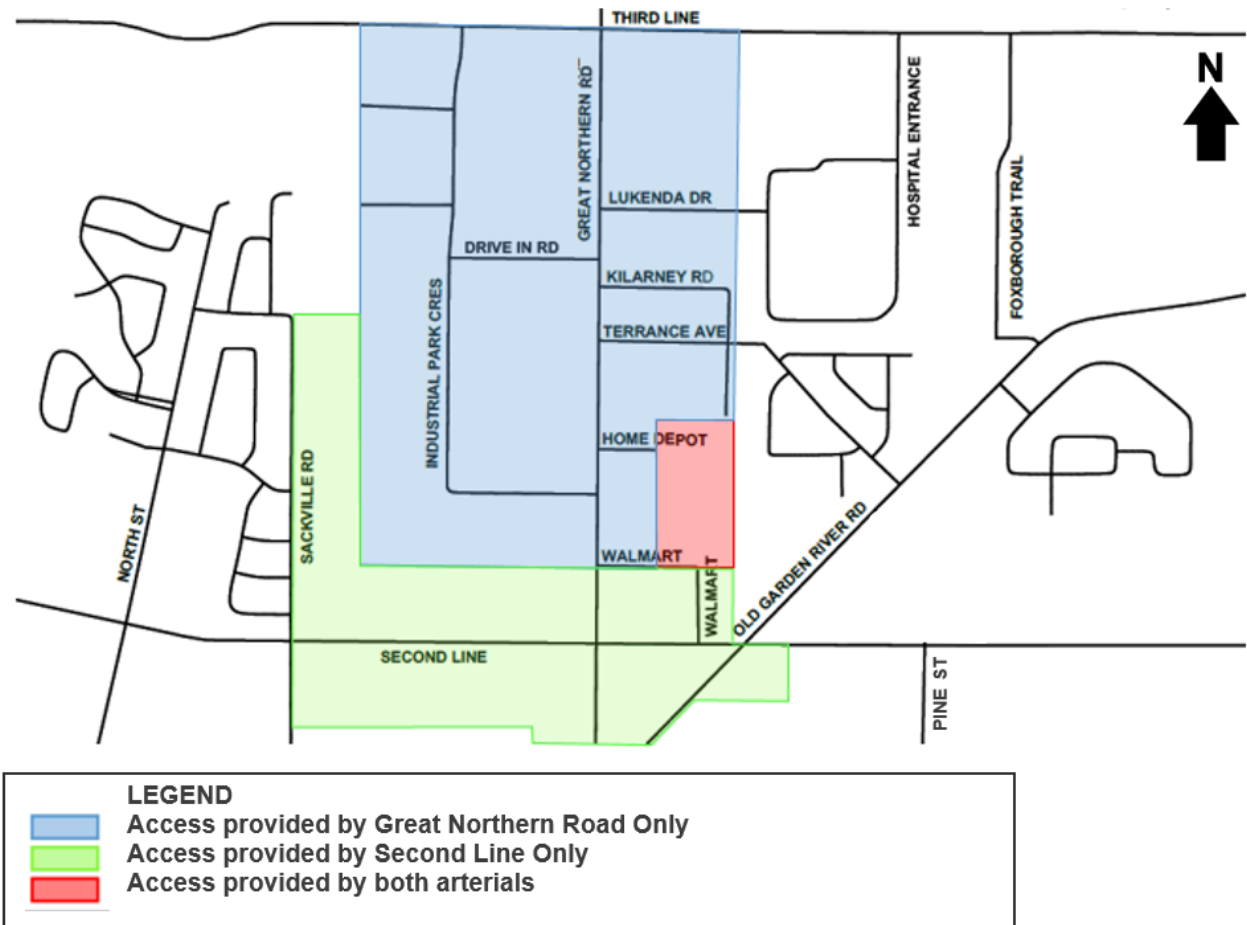


Figure 3: Existing Development Access

3.1. Alternative Solutions

The main focus of developing alternative solutions is to provide access opportunities by way of the secondary road network that attempt to avoid locally generated traffic having to pass through the Great Northern Road/Second Line intersection.

Nine alternative solutions have been developed to address operational issues and provide a secondary network to support commercial development access and to address the operational issues at Great Northern Road and Second Line.

- Alternative Solution #1 - Sackville Road North Extension to Third Line






- Alternative Solution #2 – Sackville Road North and East Extension to Industrial Park Crescent
- Alternative Solution #3 - Westerly Extension of Industrial Park Crescent to Sackville Road
- Alternative Solution #4 - Southerly extension of Industrial Park Crescent to Second Line
- Alternative Solution #5 - Relocation of traffic signal on Great Northern Road to Industrial Park Crescent and New Access Road
- Alternative Solution #6 – New signal at existing Walmart Access
- Alternative Solution #7 - Westerly extension of Drive In Road to Sackville Road
- Alternative Solution #8 – Double Left-turn onto Great Northern Road at Second Line
- Alternative Solution #9 – Easterly extension of Industrial Park Crescent to Old Garden River Road

Alternative solutions 10 through 14 attempt to correct the skew angle of the Old Garden River Road and Second Line intersection.

- Alternative Solution #10 – Easterly Extension of Walmart Driveway and Realignment of Old Garden River Road
- Alternative Solution #11 – Traffic Signal Optimization
- Alternative Solution #12 – Extension of Walmart Entrance Southerly to Willow Avenue
- Alternative Solution #13 - Single Roundabout at Old Garden River Road and Second Line
- Alternative Solution #14 - Double Roundabout at Old Garden River Road and Second Line

Each alternative solution has been evaluated using the evaluation scale illustrated in Table 1. Requirements for additional studies following the Municipal Class Environmental Assessment process are noted.

Table 1: Evaluation Scale

				
Very Low Impact (Most Positive)	Fairly Low Impact	Medium/Ambivalent Impact	Fairly High Impact	Very High Impact (Least Positive)

3.1.1. Traffic Diversion

The estimated redistribution of traffic volume for each of the provided alternatives were estimated using existing turning movement counts at intersections affected by each alternative and redistributed based on the proportion of directional turning movements towards destinations to the north, south, east, or west of the study area.

The difference in estimated catchment area that each alternative provides was used to estimate the approximate number of vehicles

Further, the percentage of vehicles travelling along Great Northern Road and Second Line which are removed from the total link volume traffic count between intersections due to employment, commercial, or industrial land uses were applied to redistributed volumes estimated by each of the alternatives to estimate a realistic number of vehicles that would entirely use each alternative.

Additionally, the estimated catchment area which each alternative can potentially serve for the industrial area surrounding Industrial Park Crescent was added to the total number of redirected trips.

Table 2 and Table 3 provide an estimate for the total amount of redirected trips for each alternative from the area west of Great Northern Road from Second Line and Great Northern Road, and the alternatives provided for the area east of Great Northern Road.

Table 2: Traffic Diversion (Second Line and Great Northern Road)

Alternative	Industrial Area Potentially Served	Number of Redirected Trips	
		AM	PM
1 – Sackville Road North Extension to Third Line	10%	310	445
2 – Sackville Road North and East Extension to Industrial Park Crescent	50%	230	295
3 – Westerly Extension of Industrial Park Crescent to Sackville Road	90%	415	530
4 – Southerly extension of Industrial Park Crescent to Second Line	100%	465	590
5 – Relocation of traffic signal on Great Northern Road to Industrial Park Crescent and New Access Road	N/A	None	
6 – New signal at existing Walmart Access	N/A	None	
7 – Westerly extension of Drive In Road to Sackville Road	70%	325	415
8 – Double Left-turn onto Great Northern Road at Second Line	N/A	None	
13 – Single Roundabout at Old Garden River Road and Second Line	N/A	None	
14- Double Roundabout at Old Garden River Road and Second Line	N/A	None	

Table 3: Traffic Diversion (Area East of Great Northern Road)

Alternative	Number of Redirected Trips	
	AM	PM
8 – Double Left-turn onto Great Northern Road at Second Line	None	
9 – Easterly extension of Walmart driveway to Old Garden River Road	30	40
10 – Realignment of Old Garden River Road to Remove Skew	40	50
11 – Traffic Signal Optimization	None	
12 – Extension of Walmart Entrance Southerly to Willow Avenue	60	80

3.2. Alternatives to Address Operational Issues

3.2.1. Alternative Solution #1 - Sackville Road North Extension to Third Line








Alternative solution #1, the northerly extension of Sackville Road to Third Line, is illustrated in Figure 4. This road extension was originally planned for construction in 2017/2018. Advantages of this solution include the following:

- An Environmental Assessment and detail design has been completed for the extension of Sackville Road and is planned for construction.
- The northerly extension of Sackville Road will provide a direct connection from Second Line to Third Line and provides a secondary north-south route for traffic for through traffic as well as some industrial generated traffic near Third Line.
- This solution will relieve the Great Northern Road and Second Line intersection by providing a new route for through traffic.
- The road extension provides access to the residential area west of Sackville Road from the north end of the City. This includes access to two schools, Kiwedin Public School and Superior Heights Highschool and Collegiate & Vocational School.
- The land required for the road extension is mainly undeveloped. Therefore, significant property impacts are not anticipated if a slight curve in the road is employed for the extension to avoid impact to the adjacent houses.

Disadvantages associated with the solution include the following:

- Unless Industrial A and Industrial B Court cul-de-sac roads are extended to meet the extended Sackville Road, access to commercial and industrial developments remain unchanged and Great Northern Road will continue to be utilized for as the primary access.
- Will contribute to an increase in traffic for residents adjacent to Sackville Road.

Table 4: Alternative Solution #1 Evaluation

Assessment		Evaluation
Feasibility	Currently planned for construction.	
Traffic Diversion	Provides a direct connection from Second Line to Third Line and provides a secondary north-south route for traffic. Approximately 310 and 445 trips are redirected from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	The land required for the road extension is mainly undeveloped. Will contribute to an increase in traffic for residents adjacent to Sackville Road.	
Cost	Moderate cost anticipated (approx. 750m of road extension) Approximately \$5.5M.	
Suitability for Providing AT	Sufficient space to incorporate AT facilities. AT facilities are currently planned for this segment.	
Public Support	15% of respondents at the Public Information Centre were in favour of this option (most positive response).	
Requirement for Additional Studies	No additional studies required.	

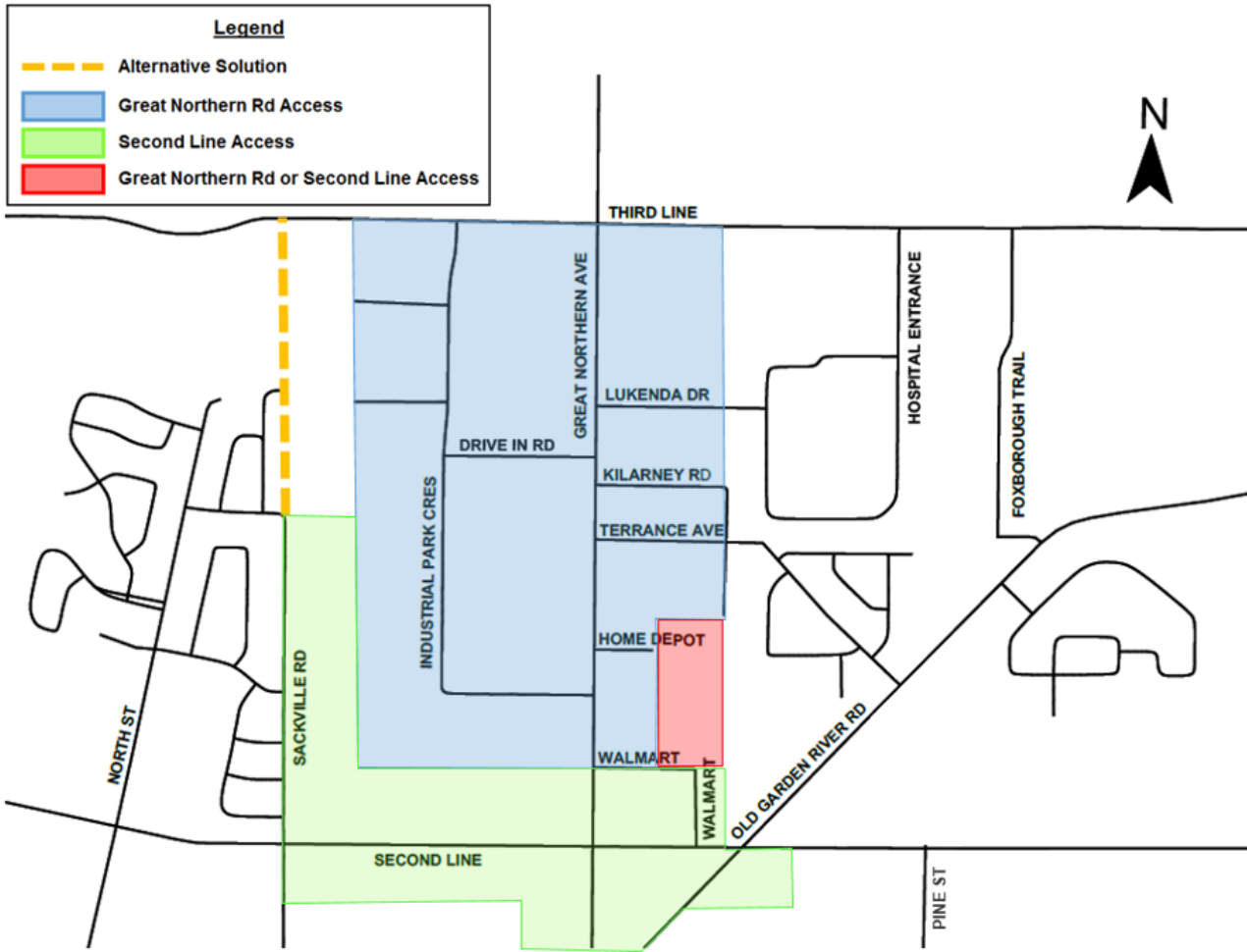


Figure 4: Alternative Solution #1 + Commercial Access Catchment (i.e. no change)

3.2.2. Alternative Solution #2 – Sackville Road North and East Extension to Industrial Park Crescent






Alternative solution #2, the north and east extension of Sackville Road to Industrial Park Crescent, includes two alignment options; connection to Industrial Court A or Industrial Court B as illustrated in Figure 5. Advantages of this solution include the following:



- The extension of Sackville Road will provide better access to Third Line for residents adjacent to and west of Sackville Road.
- This solution relieves the Great Northern Road/Second Line intersection by providing a new route for north-south traffic destined to the commercial area in the Third Line/Great Northern Road area.
- The road extension provides access to the residential area west of Sackville Road from the north end of the City. This includes access to two schools, Kiwedon Public School and Superior Heights Highschool and Collegiate & Vocational School.
- The land required for the northerly road extension is City owned.

Disadvantages associated with the solution include the following:

- Will contribute to an increase in traffic for residents adjacent to Sackville Road.
- The easterly extension may result in minor property impacts on the civic private work yards adjacent to Industrial Court A and B.
- Connection to Industrial Court B requires crossing a ravine.
- Significant upgrades to the existing Industrial Park Crescent and Industrial Court A or B roadways are required.

Table 5: Alternative Solution #2 Evaluation

Assessment		Evaluation
Feasibility	The land required for the northerly road extension is City owned.	
Traffic Diversion	Relieves the Great Northern Road/Second Line intersection. Approximately 230 and 295 trips are redirected from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	May result in minor property impacts on the civic private work yards adjacent to Industrial Court A and B. Will contribute to an increase in traffic for residents adjacent to Sackville Road.	
Cost	Moderate cost anticipated (approx. 400m of road extension assuming the Sackville Road extension is constructed) Approximately \$2.2M + cost to upgrade Industrial Park Crescent and Industrial Court A or B.	
Suitability for Providing AT	AT facilities are planned for Sackville Road and could be provided along Industrial Court providing a connection to Great Northern Road.	

Public Support	6% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule C EA.	

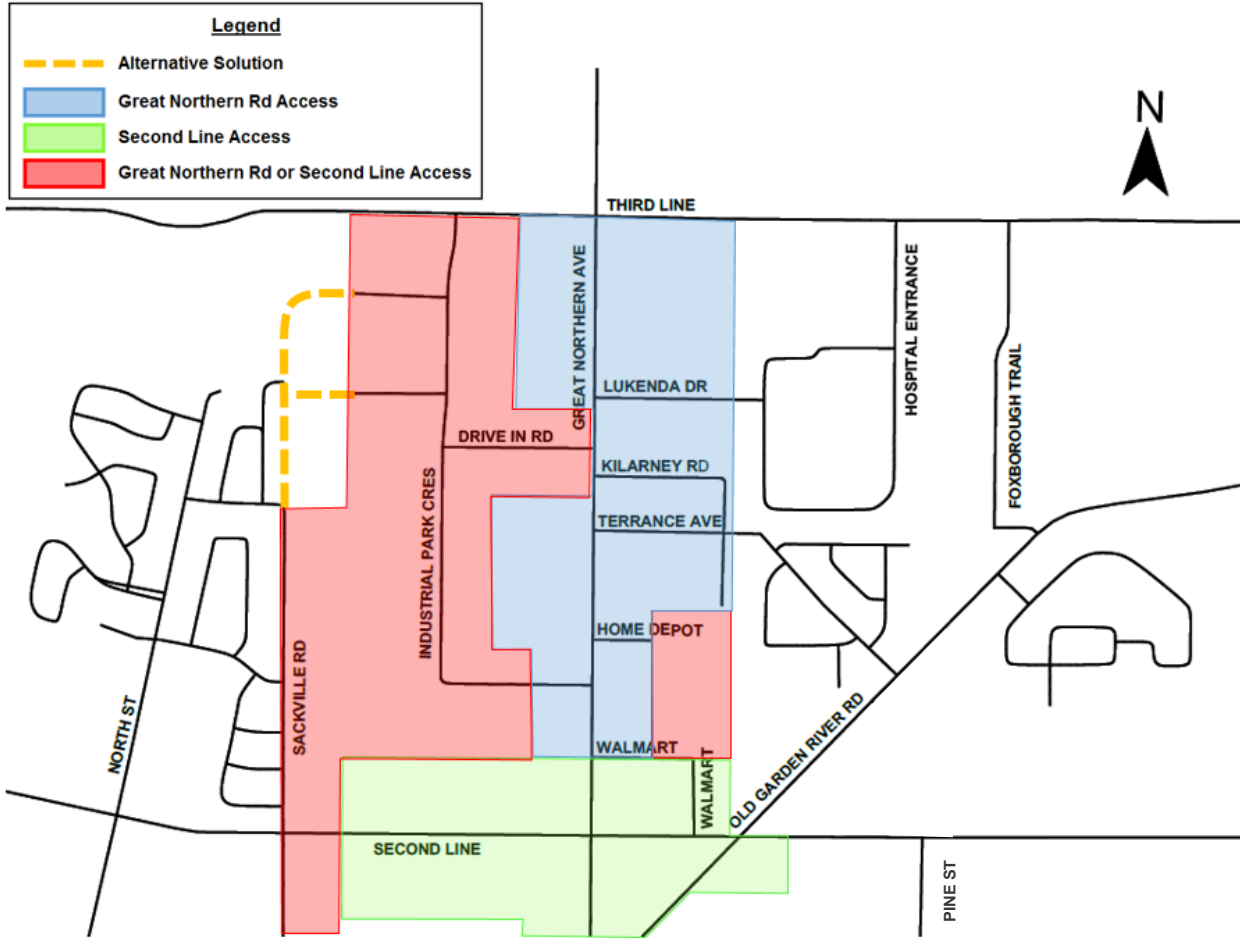


Figure 5: Alternative Solution #2 + Commercial Access Catchment

3.2.3. Alternative Solution #3 - Westerly Extension of Industrial Park Crescent to Sackville Road

Alternative solution #3, the westerly extension of Industrial Park Crescent to Sackville Road, is illustrated in Figure 6. Advantages of this solution include the following:








- Provides better access to Third Line for residents adjacent to and west of Sackville Road.
- This solution relieves the Great Northern Road/Second Line intersection by providing a new route for north-south traffic destined to the commercial area on the west side of Great Northern Road.
- Provides better access to the commercial centre on Great Northern Road.

Disadvantages associated with the solution include the following:

- The extension of Industrial Park Crescent may impact a private property (158 Sackville Road).
- Will contribute to an increase in traffic for residents adjacent to Sackville Road.
- Significant upgrades to the existing Industrial Park Crescent are required.

Together, alternative solution #1 and #3 provide both north-south and east-west connections for the developments east and west of Great Northern Road as well as the residential area west of Sackville Road.

Table 6: Alternative Solution #3 Evaluation

Assessment		Evaluation
Feasibility	Significant upgrades to the existing Industrial Park Crescent roadway are required.	
Traffic Diversion	Relieves the Great Northern Road/Second Line intersection. Approximately 415 and 530 trips are redirected from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	The extension of Industrial Park Crescent may impact a private property. Will contribute to an increase in traffic for residents adjacent to Sackville Road.	
Cost	Moderate cost anticipated (approx. 400m of road extension). Approximately \$2.2M + cost to upgrade Industrial Park Crescent.	
Suitability for Providing AT	AT facilities could be provided along Industrial Court providing a connection to Great Northern Road.	
Public Support	7% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule B EA (potential to be upgraded to a Schedule C EA).	

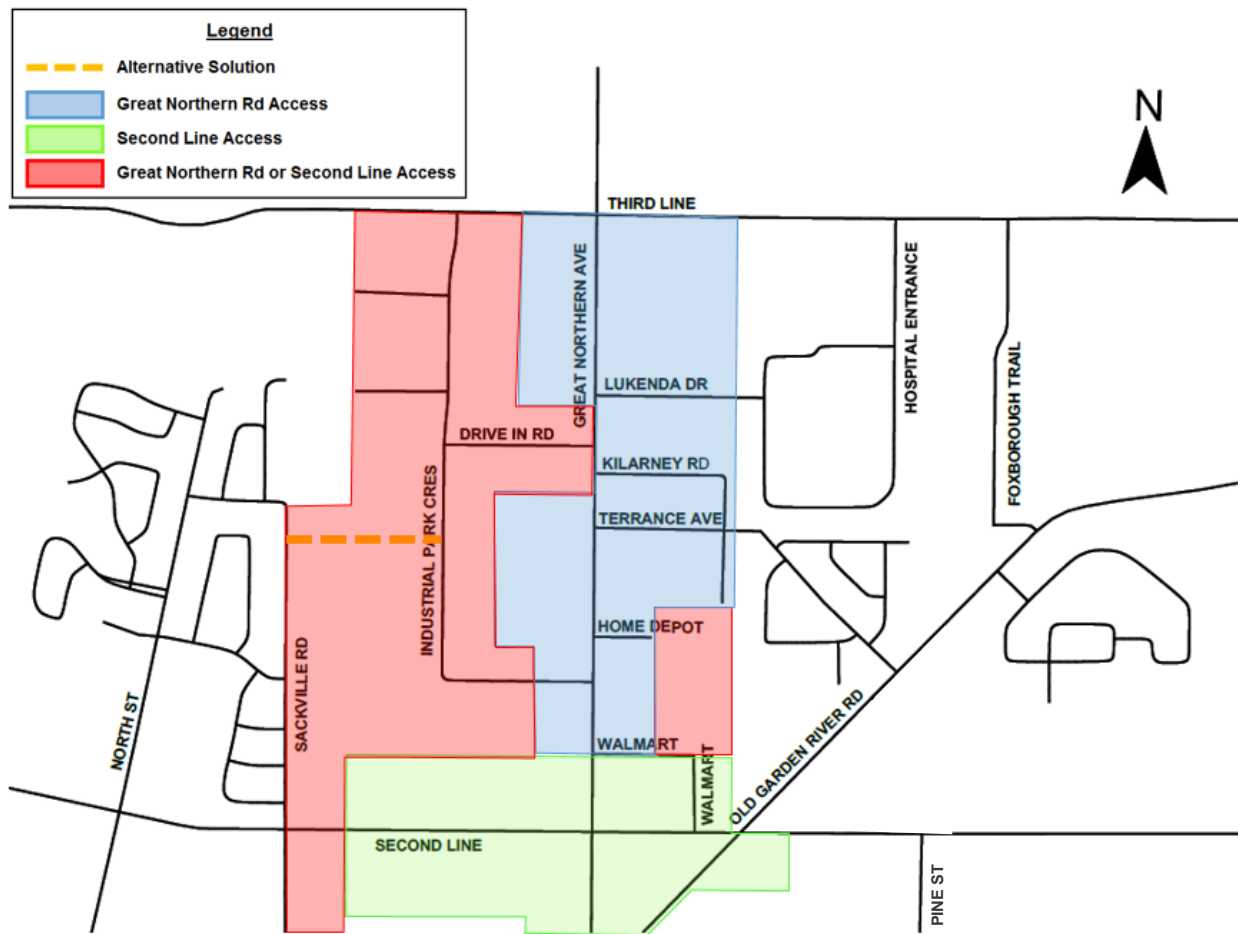


Figure 6: Alternative Solution #3 + Commercial Access Catchment

3.2.4. Alternative Solution #4 - Southerly extension of Industrial Park Crescent to Second Line








Alternative solution #4, the southerly extension of Industrial Park Crescent to Second Line, is illustrated in Figure 7. Advantages of this solution include the following:

- The southerly extension of Industrial Park Crescent to Second Line will improve the intersection operation of the Great Northern Road/Second Line intersection.
- This option provides a separation of commercial/industrial traffic from the residential traffic on Sackville Road (unlike Alternatives #1, 2 and 3).
- This solution provides access to developments on west side of Great Northern Road by providing a secondary route for northbound and southbound traffic.

Disadvantages associated with the solution include the following:

- A traffic signal will be required at the Second Line and Industrial Park Crescent intersection.
- The Industrial Park Crescent extension would have property impacts on Roofmart or Murphy Service Centre on Second Line.
- Significant upgrades to the existing Industrial Park Crescent are required.

Table 7: Alternative Solution #4 Evaluation

	Assessment	Evaluation
Feasibility	Significant upgrades to the existing Industrial Park Crescent roadway are required. A traffic signal will be required at the Second Line and Industrial Park Crescent intersection.	
Traffic Diversion	Improves the intersection operation of the Great Northern Road/Second Line intersection. Provides a separation of commercial/industrial traffic from the residential traffic on Sackville Road. Approximately 465 and 590 trips are redirected from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	May have property impacts on Roofmart or Murphy Service Centre on Second Line.	
Cost	Moderate cost anticipated (approx. 400m of road extension). Approximately \$2.2M + cost to upgrade Industrial Park Crescent.	
Suitability for Providing AT	AT facilities could be provided along Industrial Court providing a connection to Great Northern Road.	
Public Support	13% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule B EA (potential to be upgraded to a Schedule C EA).	

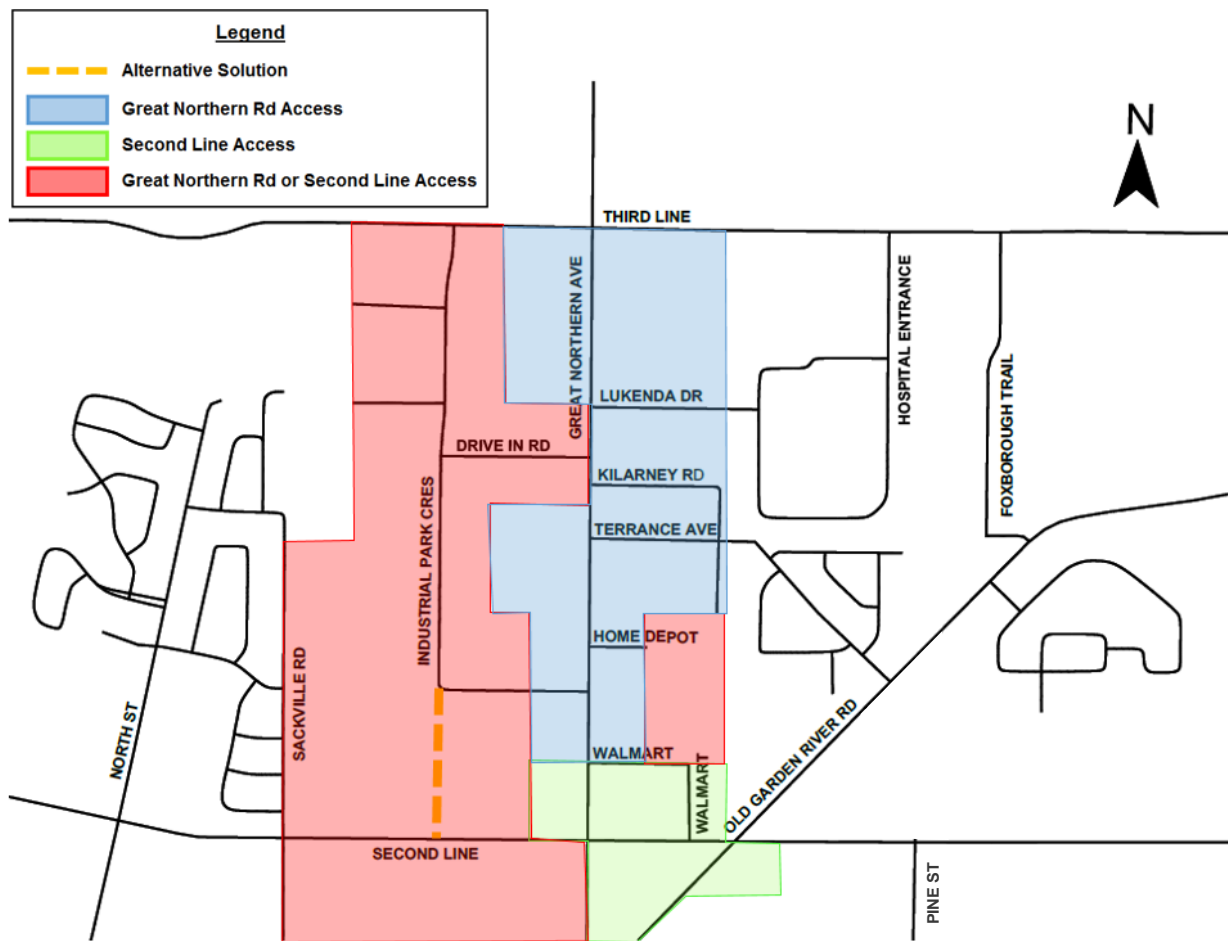


Figure 7: Alternative Solution #4 + Commercial Access Catchment

3.2.5. Alternative Solution #5 - Relocation of traffic signal on Great Northern Road to Industrial Park Crescent and New Access Road

Alternative solution #5 is illustrated in Figure 8. Currently, there are two signalized intersections on Great Northern Road between Second Line and Third Line. One signalized intersection is located at the entrance to Home Depot on the east. North of this is a second signalized intersection at Lukenda Drive/Hospital Entrance. This solution involves the relocation of the traffic signal on Great Northern Road at Home Depot to the intersection with Industrial Park Crescent. A new driveway entrance for the developments on the east side of Great Northern Road is also proposed.






Advantages of this solution include the following:



- This solution provides all-turn access to Great Northern Road with a consolidated signal at Industrial Park Crescent thereby combining several significant turning movements into one signalized intersection.
- Reduces the number of potential signals on Great Northern Road.

Disadvantages associated with the solution include the following:

- The traffic signal at the Home Depot driveway requires relocation to the intersection with Industrial Park Crescent.
- No improvement in network continuity and no change to commercial area access options.
- Required signal coordination with fibre optics between Great Northern Road intersections with Walmart, Second Line and Third Line.
- This option does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.

Table 8: Alternative Solution #5 Evaluation

	Assessment	Evaluation
Feasibility	<p>The traffic signal at the Home Depot driveway requires relocation to the intersection with Industrial Park Crescent.</p> <p>Required signal coordination with fibre optics between Great Northern Road intersections with Second Line.</p> <p>Not currently feasible based on development plans.</p>	
Traffic Diversion	<p>Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.</p> <p>No trips are redirected from the Second Line/Great Northern Road intersection.</p>	
Property/Public Impact	<p>No property impacts are anticipated.</p> <p>Previous private cost sharing enabled implementation of this signal. Therefore, some property owners may object.</p>	
Cost	<p>Approximately \$400K for traffic signal relocation.</p>	
Suitability for Providing AT	<p>Does not provide opportunities for AT.</p>	

Public Support	7% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires Schedule A EA (pre-approved).	

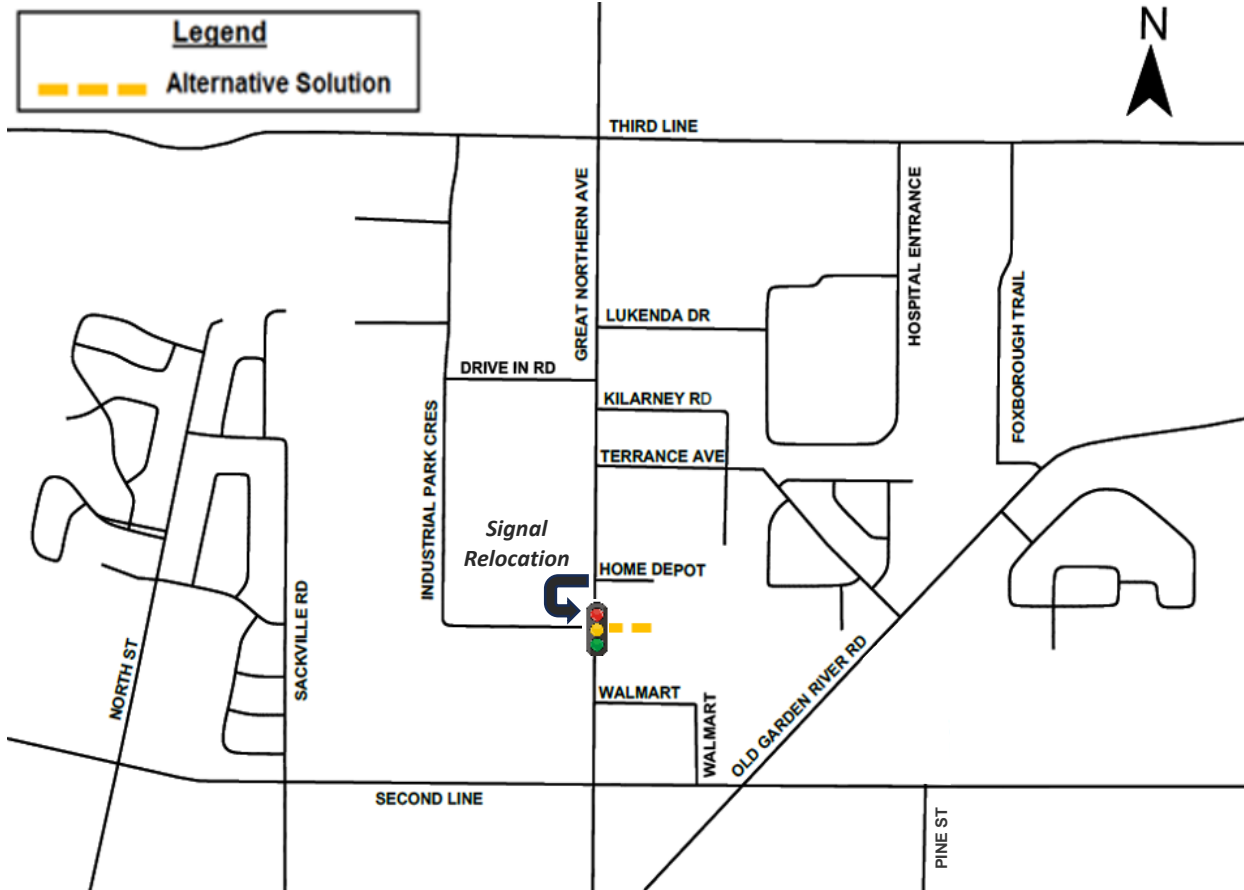


Figure 8: Alternative Solution #5 (no change in Commercial Access Catchment)

3.2.6. Alternative Solution #6 – New signal at existing Walmart Access

Alternative solution #6 involves the implementation of a new signal at the existing Walmart access on Great Northern Road and the realignment of the driveway of 459 Great Northern Road on the west side to coincide with the new signalized intersection. Alternative solution #6 is illustrated in Figure 9.

Advantages of this solution include the following:

- This solution provides signalized access for proposed development on the west side of Great Northern Road.
- Signalized intersection coincides with Walmart entrance.

Disadvantages associated with the solution include the following:

- The new signalized intersection contributes to additional delay on Great Northern Road.
- This solution does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.

Table 9: Alternative Solution #6 Evaluation








Assessment		Evaluation
Feasibility	Requires a new signal at the existing Walmart access on Great Northern Road and the realignment of the driveway of 459 Great Northern Road.	
Traffic Diversion	Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection. No trips are redirected from the Second Line/Great Northern Road intersection.	
Property/Public Impact	No property impacts are anticipated.	
Cost	Moderate cost anticipated for new traffic signal. Approximately \$400K. New signal would be partially funded from business owners.	
Suitability for Providing AT	Does not provide opportunities for AT.	
Public Support	4% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule A EA (i.e. pre-approved).	



Figure 9: Alternative Solution #6 (no change in Commercial Access Catchment)

3.2.7. Alternative Solution #7 - Westerly extension of Drive In Road to Sackville Road








Alternative solution #7, the westerly extension of Drive In Road to Sackville Road includes two alignment options as illustrated in Figure 10. Advantages of this solution include the following:

- This solution provides better access to Third Line for residents adjacent to and west of Sackville Road.
- Relieves the Great Northern Road/Second Line intersection by providing a new route for north-south traffic destined to the commercial area on the west side of Great Northern Road.
- The property required for the extension is currently undeveloped and therefore property impacts are potentially minor.

Disadvantages associated with the solution include the following:

- Contributes to a minor increase in traffic for residents adjacent to Sackville Road.
- The road extension has to potential to sever the Union Gas yard.
- Significant upgrades to the existing Industrial Park Crescent are required.

Table 10: Alternative Solution #7 Evaluation

Assessment		Evaluation
Feasibility	The property required for the extension is currently undeveloped and therefore property impacts are potentially minor.	
Traffic Diversion	Relieves the Great Northern Road/Second Line intersection. Approximately 325 and 415 trips are redirection from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	Contributes to a minor increase in traffic for residents adjacent to Sackville Road. The road extension has to potential to sever the Union Gas yard.	
Cost	Moderate cost anticipated (approx. 400m of road extension). Approximately \$2.2M + cost to update Industrial Park Crescent.	
Suitability for Providing AT	AT facilities are planned for Sackville Road and could be provided along Drive In Road providing a connection to Great Northern Road.	
Public Support	4% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule B EA (potential to be upgraded to a Schedule C EA).	

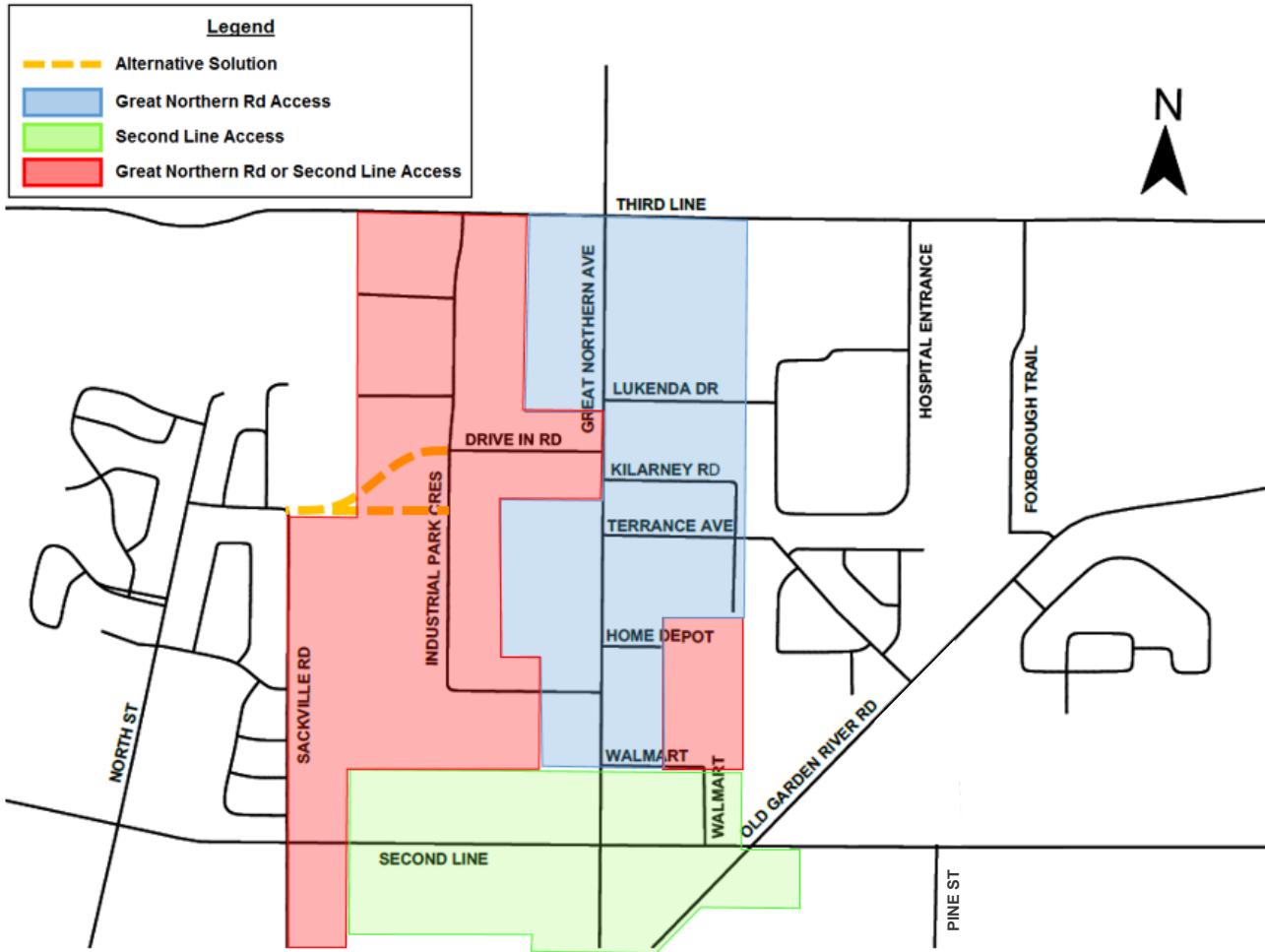


Figure 10: Alternative Solution #7 + Commercial Access Catchment

3.2.8. Alternative Solution #8 – Double Left-turn onto Great Northern Road at Second Line







Alternative solution #8 includes the widening of the Great Northern Road/Second Line intersection and the inclusion of double-left turn lanes, as illustrated in Figure 11. Advantages of this solution include the following:

- This solution would improve left-turn operations the Great Northern Road/Second Line intersection.

Disadvantages associated with the solution include the following:

- Widening of the Great Northern Road/Second Line intersection to add double left turns is extremely difficult given the built up nature of all four corners of the intersection.
- Intersection widening will impact Petro-Canada and Shell gas stations on the northwest and southeast corners of the intersection, respectively.
- Additional left turn lanes provide only a marginal increase in capacity as green time is removed from other phases of the signal in order to serve the double lefts.
- This option does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.

Table 11: Alternative Solution #8 Evaluation

	Assessment	Evaluation
Feasibility	Widening of the Great Northern Road/Second Line intersection to add double left turns is extremely difficult given the built up nature of all four corners of the intersection.	
Traffic Diversion	Improves left-turn operations the Great Northern Road/Second Line intersection. Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection. No trips are redirected from the Second Line/Great Northern Road intersection.	
Property/Public Impact	Significant property impacts are anticipated. Contaminated soils are likely to be encountered.	
Cost	High cost anticipated for intersection widening. Approximately \$500K-\$1M for intersection widening plus property costs.	
Suitability for Providing AT	Does not provide opportunities for AT.	
Public Support	4% of respondents at the Public Information Centre were in favour of this option.	

Requirement for
Additional Studies

Requires a Schedule B EA.

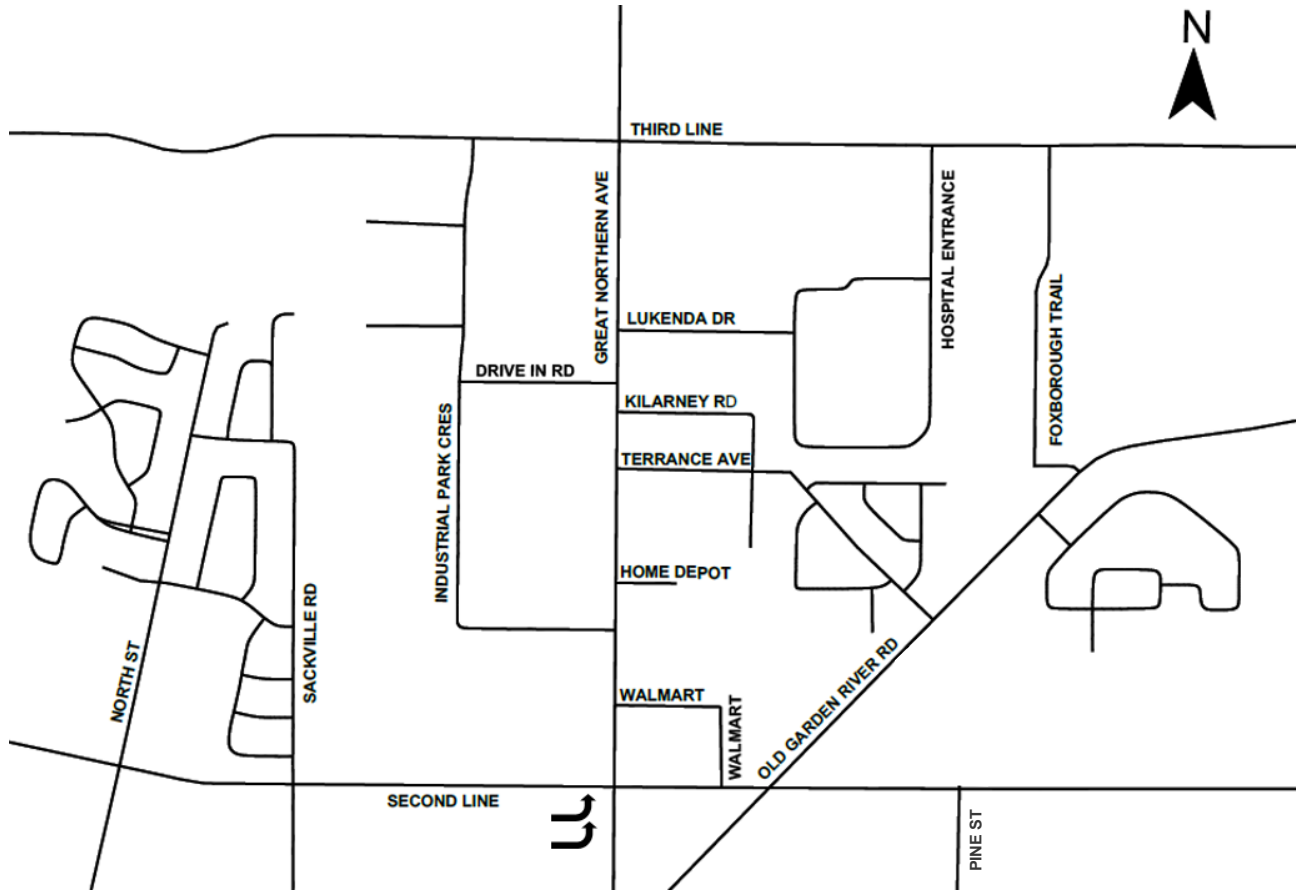


Figure 11: Alternative Solution #8 (no change in Commercial Access Catchment)

3.2.9. Alternative Solution #9 – Easterly extension of Industrial Park Crescent to Old Garden River Road

Alternative solution #9, the easterly extension of the Industrial Park Crescent to Old Garden River Road is illustrated in Figure 12. The new road passes through the existing Walmart parking lot and through the woodlot adjacent to Old Garden River Road.







Advantages of this solution include the following:

- This option has the potential to improve traffic circulation as it provides a direct extension of Industrial Park Crescent to Old Garden River Road.
- Provides a new access to Great Northern Road from the residential area to the east.

Disadvantages associated with the solution include the following:

- Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.
- This option will potentially have an impact on the homes and woodlot adjacent to Old Garden River Road.
- This option also requires a portion of the Walmart parking lot.
- Will result in additional traffic at the Second Line/Old Garden River Road intersection.

Table 12: Alternative Solution #9 Evaluation

Assessment		Evaluation
Feasibility	Moderate property impacts anticipated.	
Traffic Diversion	<p>Potential to improve traffic circulation as it provides a direct extension of Industrial Park Crescent to Old Garden River Road.</p> <p>Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.</p> <p>Approximately 30 and 40 trips are redirection from the Second Line/Great Northern Road intersection in the AM and PM, respectively.</p>	
Property/Public Impact	Potential to have an impact on the homes and woodlot adjacent to Old Garden River Road.	
Cost	Moderate cost anticipated for road construction (approx.660m). Approximately \$3.6M.	
Suitability for Providing AT	This option could include consideration for AT and provide a direct link to the Hub trail from the commercial area on Great Northern Road.	
Public Support	This option was not presented to the public at the Public Information Centre. Public support is unknown.	N/A
Requirement for Additional Studies	Requires a Schedule C EA.	

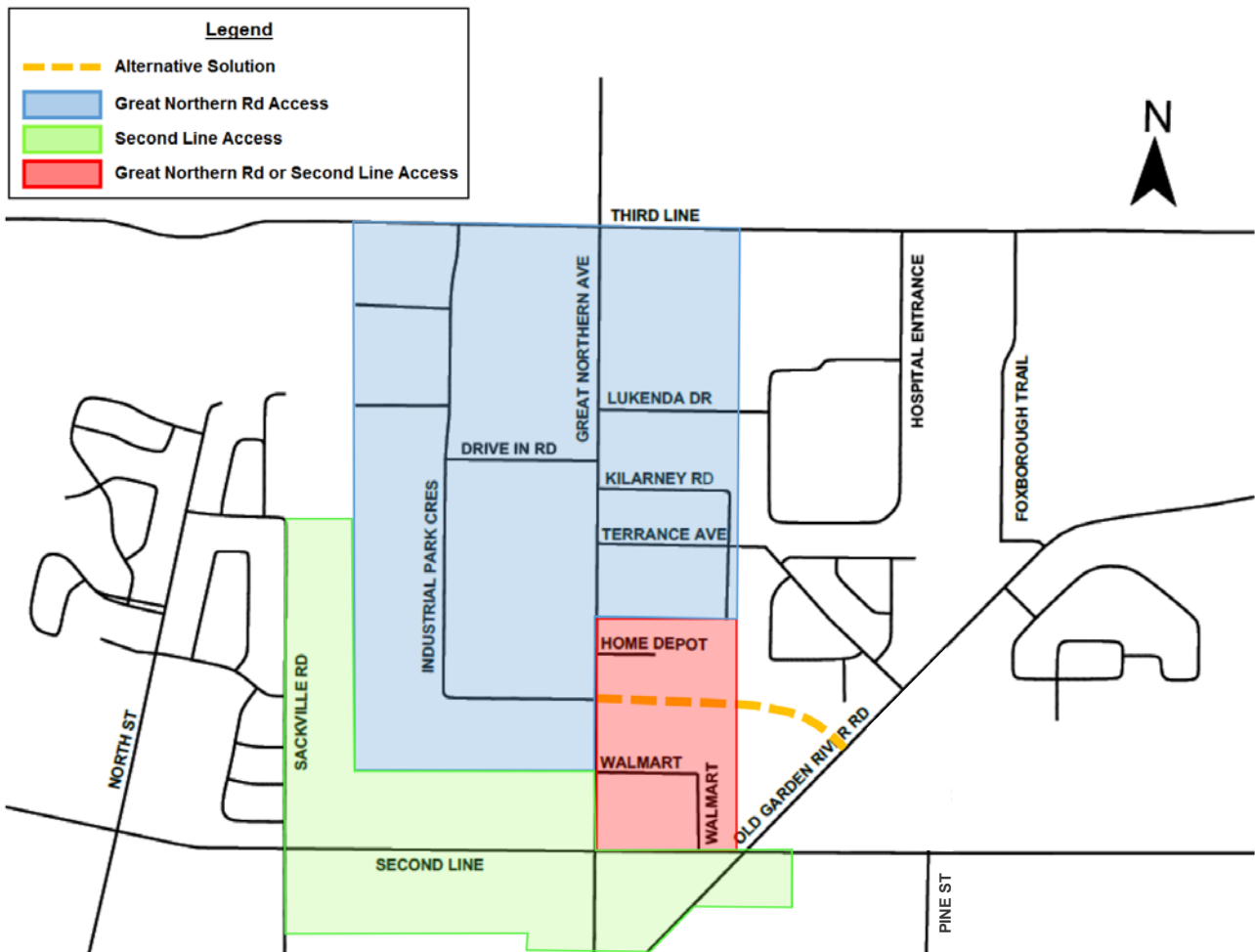


Figure 12: Alternative Solution #9 – Easterly extension of Walmart driveway to Old Garden River Road

3.3. Old Garden River Road and Second Line Intersection

3.3.1. Alternative Solution #10 – Easterly Extension of Walmart Driveway and Realignment of Old Garden River Road

Alternative solution #10 is illustrated in Figure 13. The easterly extension of Walmart driveway and realignment of Old Garden River Road includes the removal of the intersection of Old Garden River Road and Second Line. A new north-south connection from the existing Walmart entrance on Second Line with a signalized intersection is proposed as well as a new connection from Old Garden River Road southerly to Second Line. A realignment of the north leg of Old Garden River Road is also proposed.





Advantages of this solution include the following:

- This option will improve the operations at the Old Garden River Road intersection by removing the skewed intersection.
- The new access road from the Walmart entrance southerly provides an alternative north-south connection from the commercial area on Great Northern Road.
- Improves the Walmart/Home Depot access.

Disadvantages associated with the solution include the following:

- There is potential for property impacts at The Water Tower Inn and a business on the northeast corner of the Old Garden River Road/Second Line intersection.
- A traffic signal is required at the intersection with the Walmart entrance.

Table 13: Alternative Solution #10 Evaluation

	Assessment	Evaluation
Feasibility	Requires a new traffic signal at the Walmart entrance. Property is required for new connection roads however; this land is available for development.	
Traffic Diversion	Improves the operations at the Old Garden River Road intersection by removing the skewed intersection. The new access road from the Walmart entrance southerly provides an alternative north-south connection from the commercial area on Great Northern Road. Approximately 40 and 50 trips are redirected from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	There is potential for property impacts at The Water Tower Inn and a business on the northeast corner of the Old Garden River Road/Second Line intersection.	
Cost	Moderate cost anticipated for new traffic signal and road construction (approx. 350m). Approximately \$2.4M. City costs could be greatly reduced with developer cost sharing.	

Suitability for Providing AT	AT facilities could be provided along new roads providing a connection to the Hub Trail. No opportunity to provide an east-west route to connect to the network.	
Public Support	6% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule C EA.	

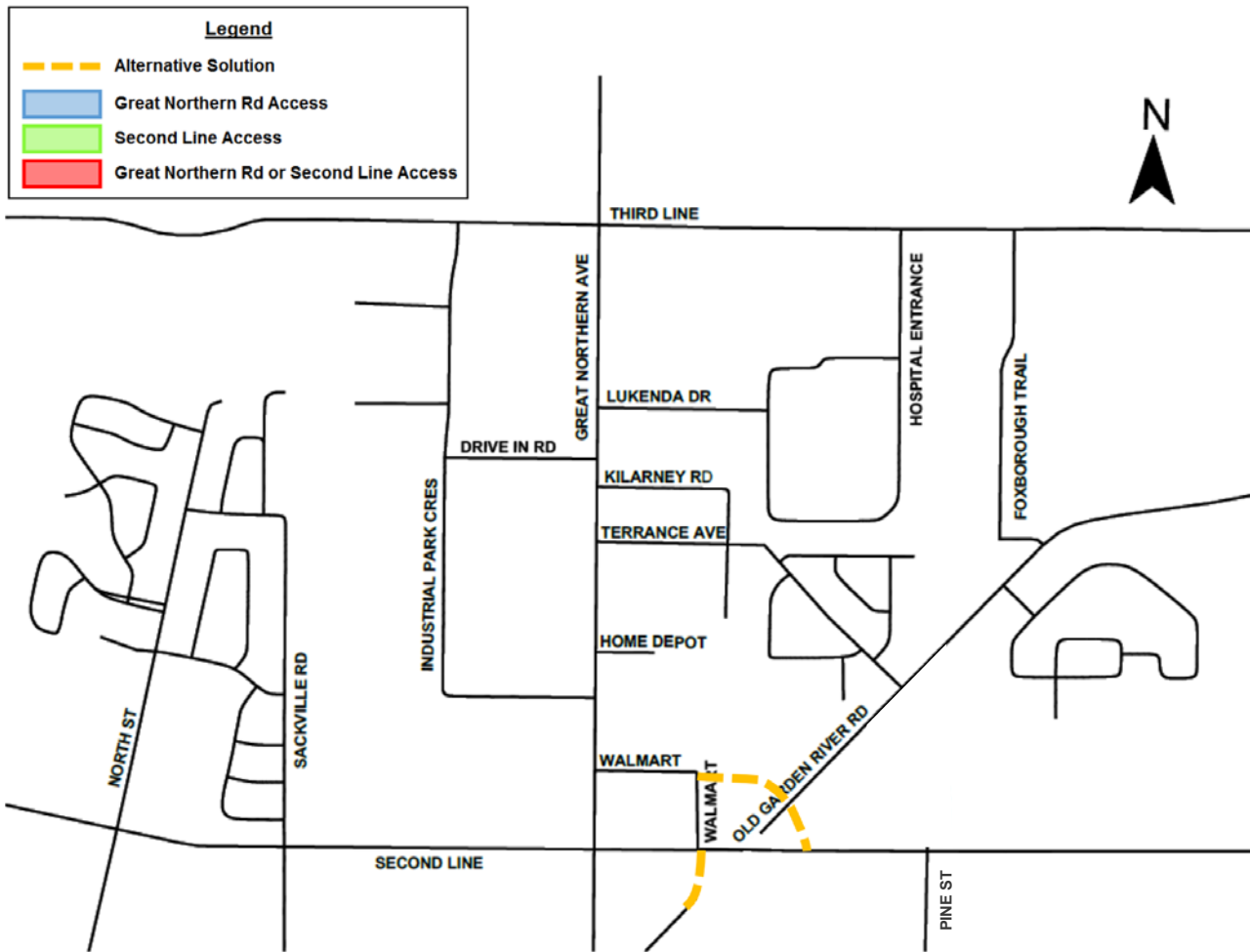


Figure 13: Alternative Solution #10

3.3.2. Alternative Solution #11 – Traffic Signal Optimization

Alternative solution #11 includes the optimization of signals along the Second Line and Great Northern Road corridor as illustrated in Figure 14. An advanced left-turn will be permitted at Old Garden River Road.








Advantages of this solution include the following:

- This solution would improve left-turn operations at the Great Northern Road/Second Line intersection.
- This solution can accommodate variable demand throughout the day.
- Low cost compared to other options requiring construction of new roads or intersection reconstruction.

Disadvantages associated with the solution include the following:

- This solution has limited capabilities for operational benefits.
- This option does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection.

Table 14: Alternative Solution #11 Evaluation

Assessment		Evaluation
Feasibility	Can be implemented without property impacts or significant costs.	
Traffic Diversion	Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection. Limited capabilities for operational benefits. No trips are redirected from the Second Line/Great Northern Road intersection.	
Property/Public Impact	No property impacts are anticipated.	
Cost	Low cost compared to other options requiring construction of new roads or intersection reconstruction. Approximately \$20K.	
Suitability for Providing AT	Does not provide opportunities for AT.	
Public Support	13% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Signal optimizations study required.	

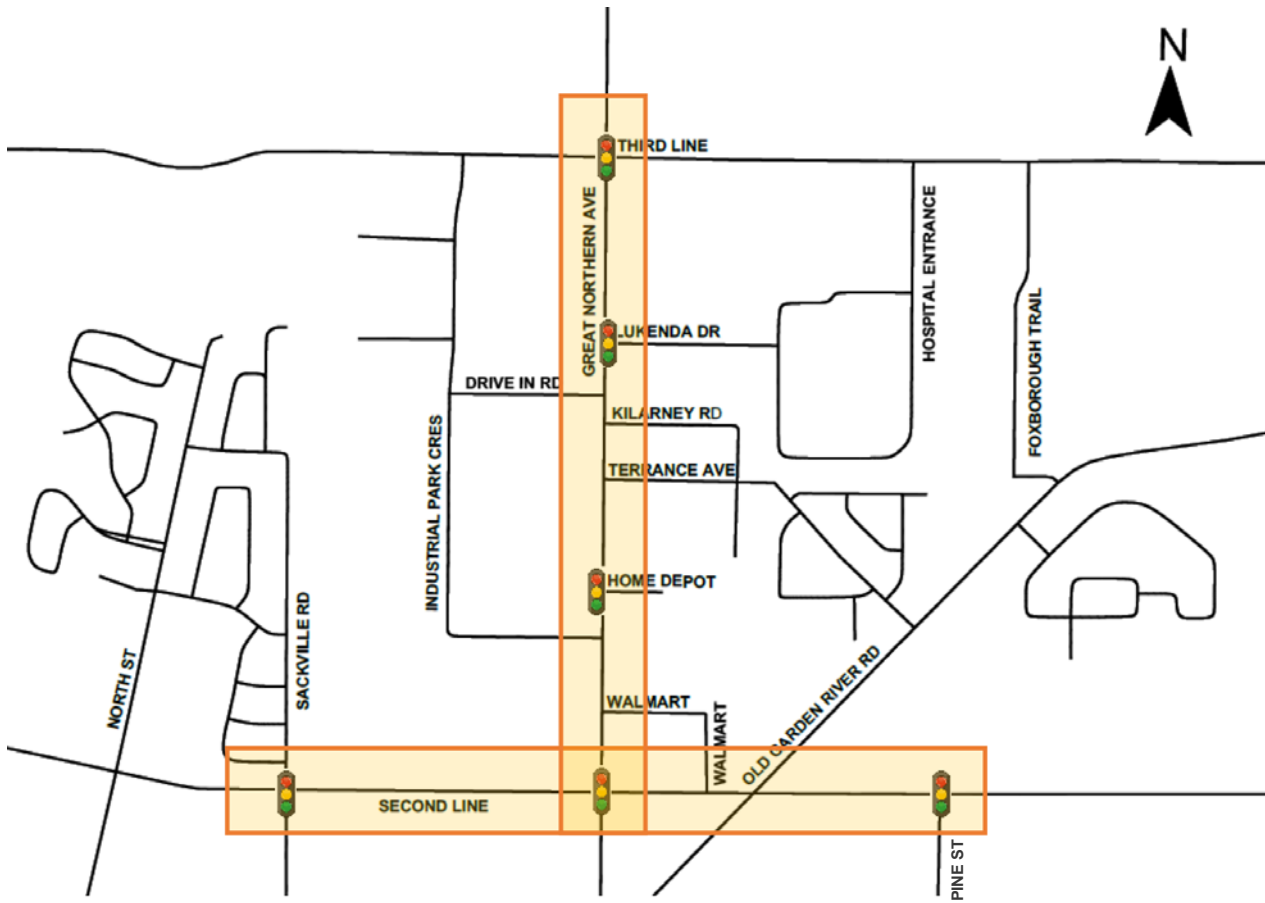


Figure 14: Alternative Solution #11

3.3.3. Alternative Solution #12 – Extension of Walmart Entrance Southerly to Willow Avenue

Alternative solution #12 is illustrated in Figure 15. The southerly extension of the Walmart entrance to Willow Avenue will utilize the existing emergency services driveway connecting Old Garden River Road and Northern Avenue. The south leg of Old Garden River Road will be closed to through traffic and the traffic signal will be relocated to the intersection of Willow Avenue/Walmart Entrance and Second Line.





Advantages of this solution include the following:

- This option provides a new north-south route via Willow Avenue as an alternative to Great Northern Road
- Improves traffic operations at the Great Northern Road/Second Line intersection.
- Simplifies the intersection of Old Garden River Road/ Second Line by removing conflicting movements.
- The road extension will utilize the existing emergency services driveway

Disadvantages associated with the solution include the following:

- Signal coordination along Second Line will be required.
- This solution will have minor property impacts on two metal garages on the southeast corner of the Old Garden River Road/Second Line intersection and will require the purchase of property.

Table 15: Alternative Solution #12 Evaluation

	Assessment	Evaluation
Feasibility	Requires a signal coordination along Second Line. Property is required for new connection roads however; this land is assumed available for development.	
Traffic Diversion	Provides a new north-south route via Willow Avenue as an alternative to Great Northern Road. Improves traffic operations at the Great Northern Road/Second Line intersection. Simplifies the intersection of Old Garden River Road/ Second Line by removing conflicting movements. Approximately 60 and 80 trips are redirection from the Second Line/Great Northern Road intersection in the AM and PM, respectively.	
Property/Public Impact	This solution will have minor property impacts on two metal garages on the southeast corner of the Old Garden River Road/Second Line intersection and will require the purchase of property. Water Tower property will be required.	
Cost	Moderate cost anticipated for road construction (approx. 500m). Approximately \$2.7M.	

Suitability for Providing AT	AT facilities could be provided along new roads providing a connection to the Hub Trail. No opportunity to provide an east-west route to connect to the network.	
Public Support	7% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule C EA.	

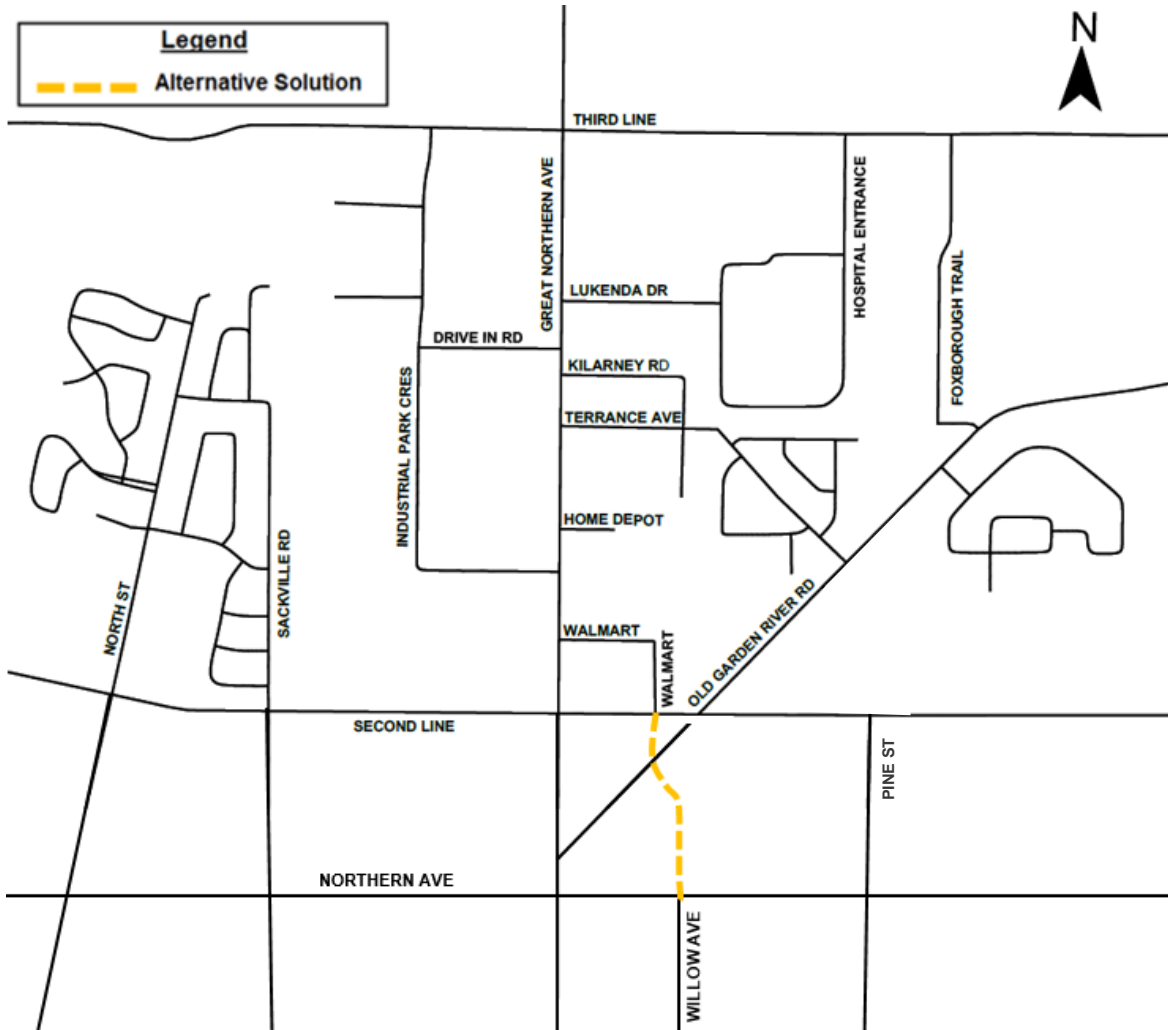


Figure 15: Alternative Solution #12

3.3.4. Alternative Solution #13 - Single Roundabout at Old Garden River Road and Second Line








Alternative solution #13, redesigns the Old Garden River Road and Second Line intersection as a roundabout, as illustrated in Figure 16. Advantages of this solution include the following:

- The intersection reconfiguration to a roundabout improves intersection geometry for both locations allowing for safe turning movements in all directions.
- With a roundabout, the traffic signal at the Old Garden River Road and Second Line intersection can be removed.

Disadvantages associated with the solution include the following:

- The roundabout will have significant property impacts on the properties immediately northwest and southeast of the roundabout. Preliminary concept drawings for the roundabout are provided in Appendix A.
- Due to the property requirements and road reconstruction, it is anticipated that this solution will have significant costs associated (\$1M+).

Table 16: Alternative Solution #13 Evaluation

	Assessment	Evaluation
Feasibility	Significant property impacts anticipated and road reconstruction required.	
Traffic Diversion	Improves intersection geometry for both locations allowing for safe turning movements in all directions. Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection. No trips are redirected from the Second Line/Great Northern Road intersection.	
Property/Public Impact	Significant property impacts on the properties immediately northwest and southeast of the roundabout are anticipated.	
Cost	High cost anticipated for roundabout construction due to property impacts. Approximately \$1M.	
Suitability for Providing AT	No opportunity to provide an east-west route to connect to the network.	
Public Support	7% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule B EA.	

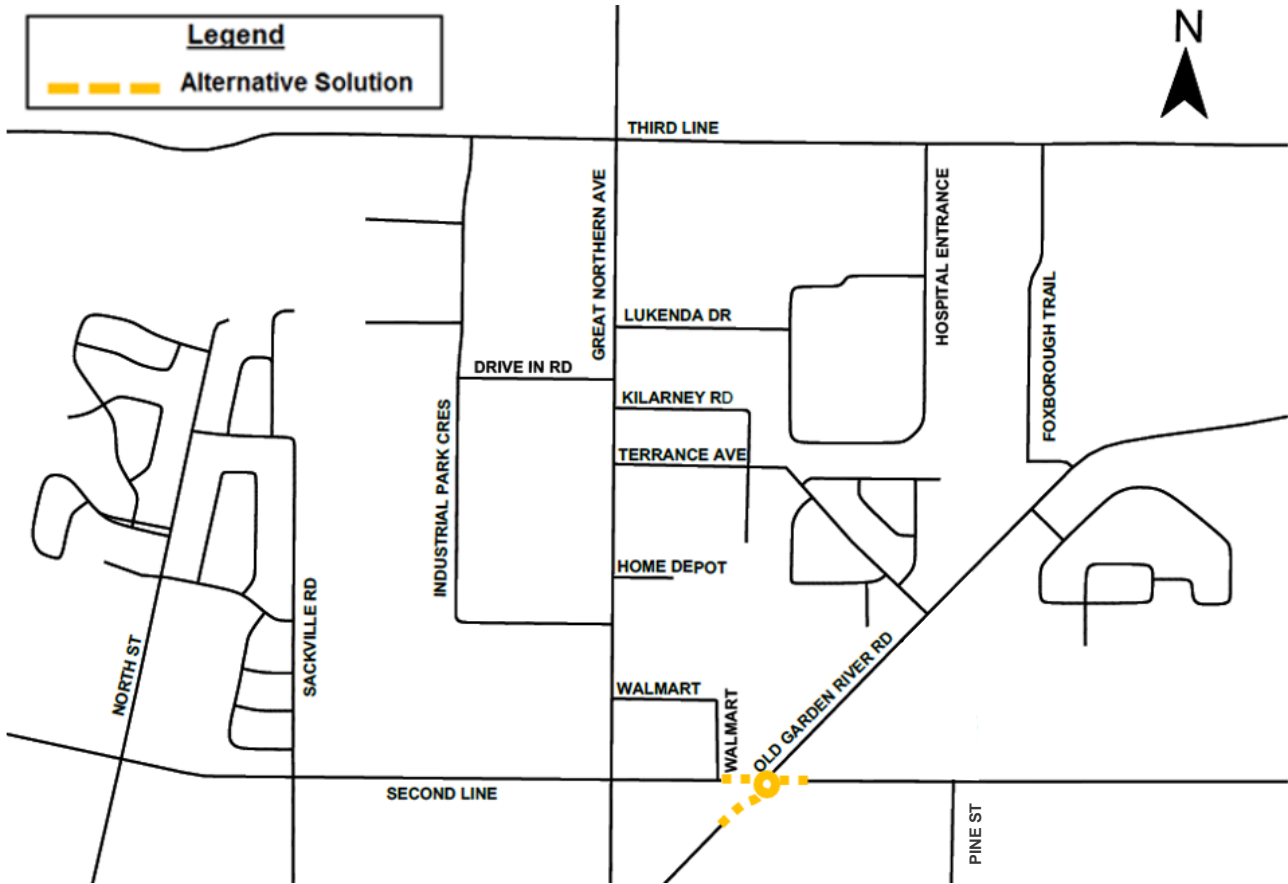


Figure 16: Alternative Solution #13

3.3.5. Alternative Solution #14 - Double Roundabout at Old Garden River Road and Second Line

Alternative solution #14 is illustrated in Figure 17. This solution reconfigures the intersection of Old Garden River Road and Second Line to a roundabout with a second roundabout at the Walmart entrance on Second Line. The south leg of the Old Garden River Road roundabout will be closed. Preliminary concept drawings for the double roundabout are provided in Appendix B.








Advantages of this solution include the following:

- The intersection reconfiguration to a roundabout improves intersection geometry for both locations allowing for safe turning movements in all directions.
- With a roundabout, the traffic signal at the Old Garden River Road and Second Line intersection can be removed.

Disadvantages associated with the solution include the following:

- This solution presents similar property impacts compared to alternative solution #7 due to the location of the roundabouts.
- Capital costs for this solution are anticipated to be higher than alternative solution #7 as two roundabouts require construction (~\$1.75m).

Table 17: Alternative Solution #14 Evaluation

	Assessment	Evaluation
Feasibility	Significant property impacts anticipated and road reconstruction required.	
Traffic Diversion	Improves intersection geometry for both locations allowing for safe turning movements in all directions. Does not provide an alternative route for local and through traffic and does not relieve the Second Line/Great Northern Road intersection. No trips are redirected from the Second Line/Great Northern Road intersection.	
Property/Public Impact	Significant property impacts on the properties immediately northwest and southeast of the roundabout are anticipated.	
Cost	High cost anticipated for roundabout construction due to property impacts. Approximately \$1.75M.	
Suitability for Providing AT	No opportunity to provide an east-west route to connect to the network.	
Public Support	7% of respondents at the Public Information Centre were in favour of this option.	
Requirement for Additional Studies	Requires a Schedule B EA.	

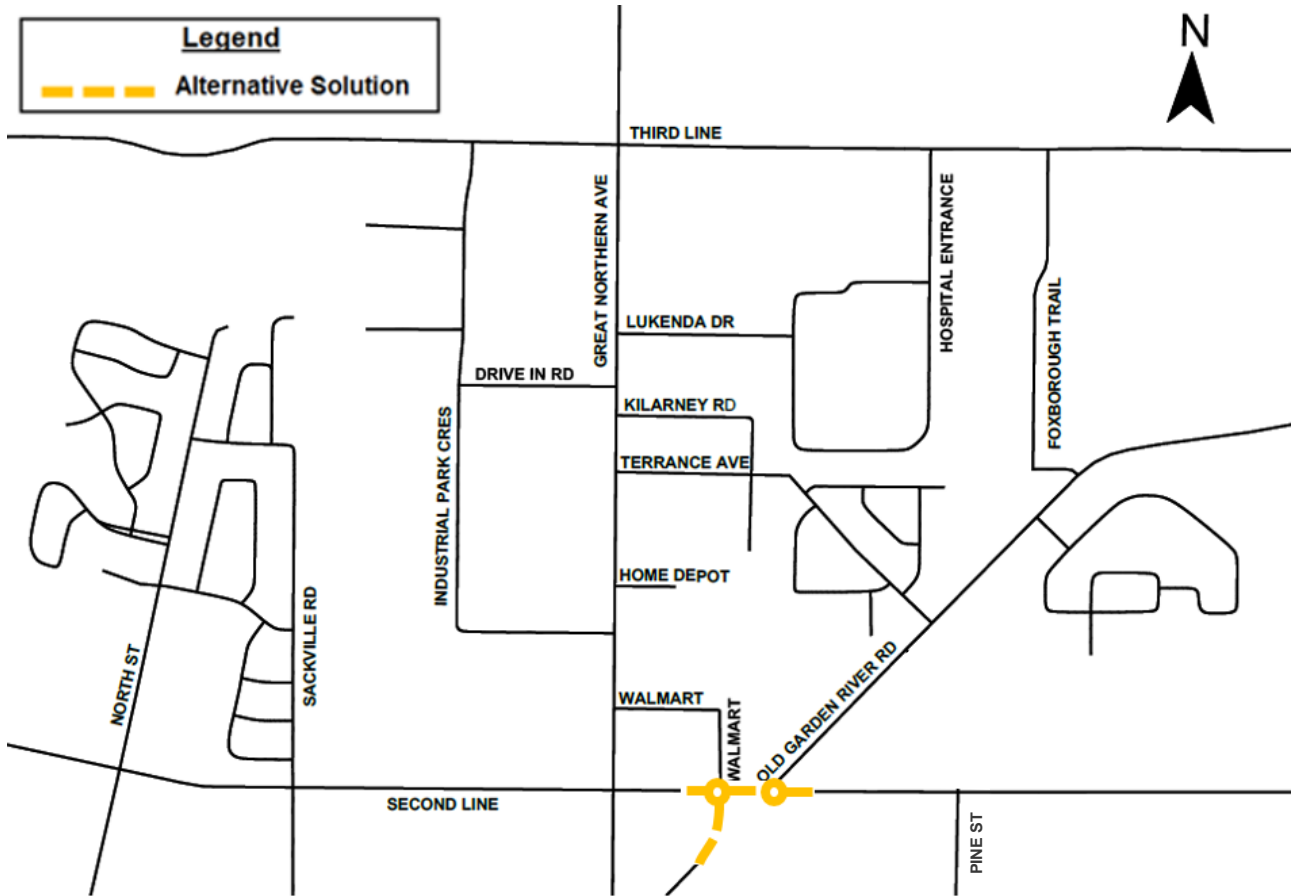


Figure 17: Alternative Solution #14

3.4. Ideal Road Network

The area surrounding the Second Line/Great Northern Road intersection is the busiest in the City with the heaviest vehicular traffic. Between Carmen's Way and Black Road, Second Line operates as the TransCanada Highway and services provincial commuter traffic passing through the City. Local traffic also utilize the Second Line/Great Northern Road intersection to gain access to the commercial area on Great Northern as well as the Sault Area Hospital and two high schools (St. Mary's and Superior Heights) from all sides of the City.

As discussed in Section 3, new routes for existing and future development access and/or bypass routes are needed to adequately address the operational issues and poor traffic conditions at the Second Line/Great Northern Road intersection. In short, a secondary road network is needed to alleviate the primary network and to reduce congestion at this node.

Comprised of a number of options considered in the previous section, an "ideal" comprehensive secondary road network is illustrated in Figure 18. While likely impractical from other perspectives, this network is ideal from a traffic engineering perspective and would provide a series of new roads that address the lack of choice for vehicles entering and exiting the primary network. Additionally, the secondary network includes modifications to the intersection of Old Garden River Road and Second Line, which presents difficulty for left-turning traffic due to the skew of the intersection. Additional factors such as land availability and funding would influence the feasibility of implementing the ideal network. Additionally, options such as the realignment of Pine Street are likely infeasible.

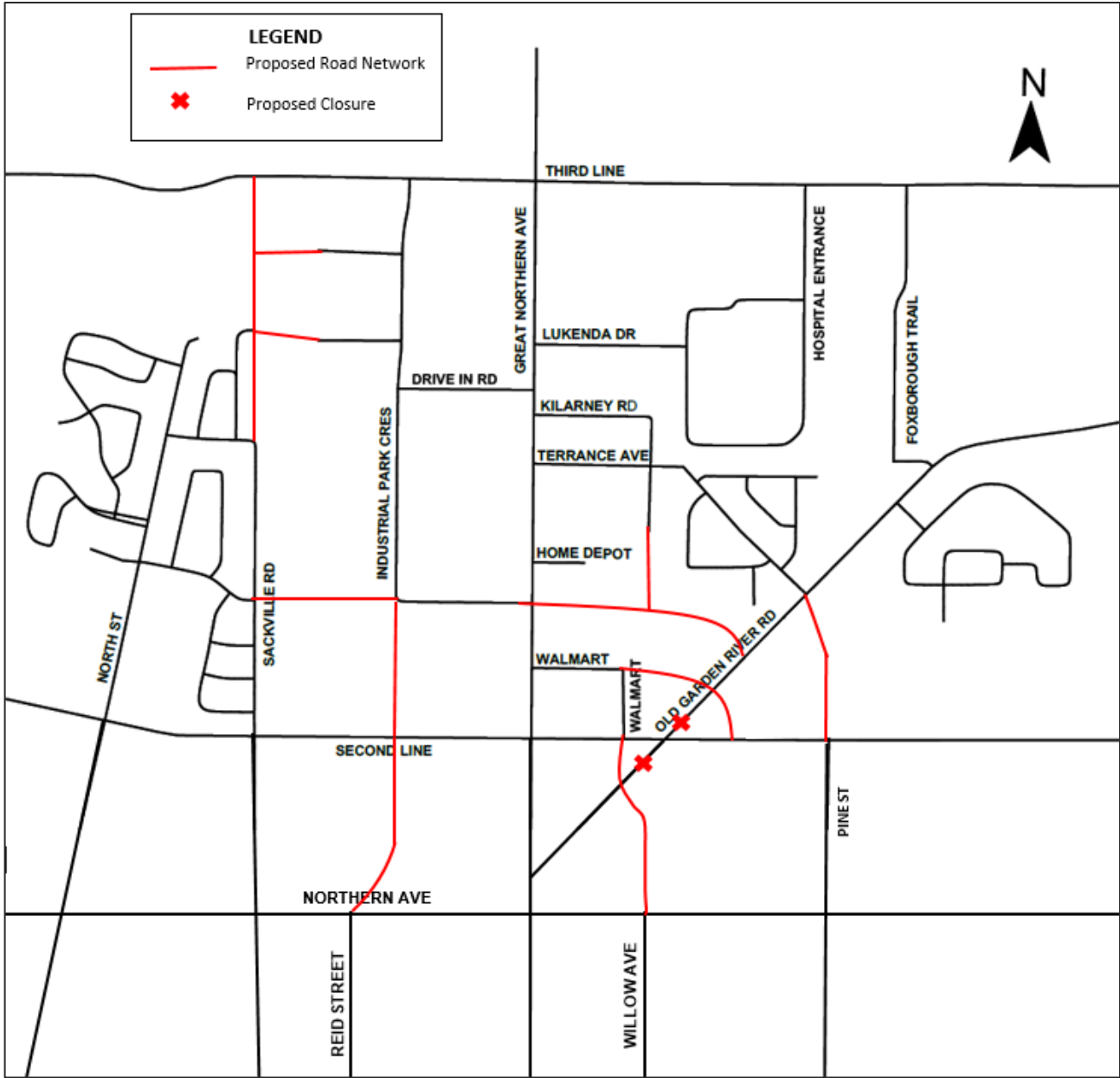


Figure 18: Ideal Secondary Road Network

3.5. Evaluation

Table 18 ranks the alternative solutions in order of highest to lowest overall effectiveness. The options above the red line are considered worth pursuing by the City as opportunities arise.

Table 18: Alternative Solutions Effectiveness Evaluation

Alternative Solution #	Feasibility	Cost	Traffic Diversion	Overall Effectiveness Score
1 - Sackville Road North Extension to Third Line				
4 - Southerly extension of Industrial Park Crescent to Second Line				
7 - Westerly extension of Drive In Road to Sackville Road ¹				
2 – Sackville Road North and East Extension to Industrial Park Crescent				
3 - Westerly Extension of Industrial Park Crescent to Sackville Road				
10 – Easterly Extension of Walmart Driveway and Realignment of Old Garden River Road				
12 – Extension of Walmart Entrance Southerly to Willow Avenue				
11 – Traffic Signal Optimization				
9 – Easterly extension of Industrial Park Crescent to Old Garden River Road				
6 – New signal at existing Walmart Access				
8 – Double Left-turn onto Great Northern Road at Second Line				
13 - Single Roundabout at Old Garden River Road and Second Line				
14 - Double Roundabout at Old Garden River Road and Second Line				

¹ Similar benefits to Alternative Solution #2, therefore not required if Alternative Solution #2 is implemented.



4. Conclusions

A priority is not inferred by the order in which the alternative solutions are listed above the red cut-off line in Table 18. The timing of implementation is affected by the following factors:

- Timing of adjacent development and ability to implement improvements simultaneously;
- EA approval;
- Availability of funds; and
- Potential for cost sharing (developers, federal or provincial government).

It is noted that alternatives that provide a connection between Second Line, Sackville Road and Industrial Park Crescent present an overlap in catchment areas and therefore present some double counting in traffic diversion. The Sackville Road north and east extension (Alternative Solution #2) provides service to approximately 50% of the industrial area. Alternatively, the westerly extension of Industrial Park Crescent (Alternative Solution #3) provides service to 90% of the industrial area, however a portion of this coverage overlaps the benefits provided by the Sackville Road north and east extension.

Providing a connection that services the west end of the City via Second Line (Alternative Solution #4) provides the highest degree of effectiveness in terms of relieving the critical eastbound left turning movements at the Second Line/Great Northern Road intersection for traffic destined to the industrial area west of Great Northern Road. Even though there is some overlap in the traffic diversion benefits for Alternatives Solutions 2,3,4 and 7, there is some benefit in proceeding with at least two of these alternatives to provide good traffic circulation for all development blocks on the west side of Great Northern Road.

Although widening of the Second Line/Great Northern Road intersection would improve operations at the intersection, widening is extremely difficult and costly due to the built up nature of all four corners of the intersection (as well as potential soil contamination). In addition, it attempts to accommodate the problem rather than dispersing the locally generated traffic to a secondary road network.

The Sackville Road extension (Alternative Solution #1) is the primary option to provide an alternative north south route for through traffic, which is currently lacking in the existing road network. This has EA approval and detail design has been completed.

On the east side of Great Northern Road, new access roads (Alternative Solutions #9 and 10) connecting to Second Line via Old Garden River Road eliminate the skewed intersection of Old Garden River Road/Second Line and provide vehicles with access to the commercial area east of Great Northern Road avoiding the Second Line/Great Northern Road intersection. The more feasible option (Alternative Solution #10), may be opportune should redevelopment take place along the alignment.

The northerly extension of Willow Avenue to Second Line provides vehicles from the south destined to the commercial area east of Old Garden River Road with a direct route avoiding the Second Line/Great Northern Road intersection and results in minor traffic diversion for the Second Line/Great Northern Road intersection.

Signal optimization is worthy of consideration once the new traffic signal at the Walmart entrance is in place, as currently proposed by the developer on the west side of Great Northern Road.

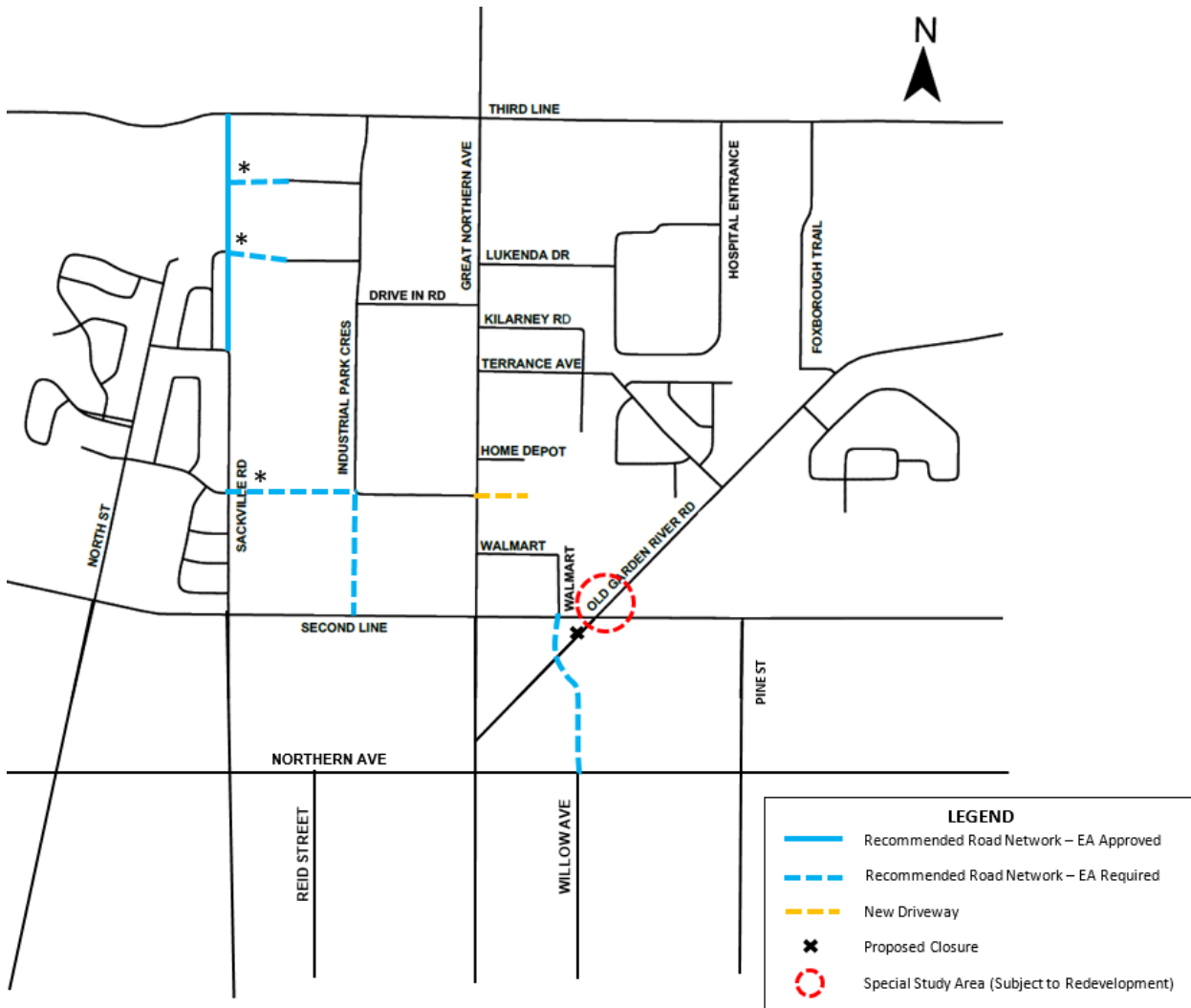
At the time of undertaking this study, a commercial development (Grocery Store) application was active at the NW quadrant of the Great Northern Road/Second Line intersection (north of the gas station) which presented a challenge as to where access would be allowed onto the two major roads. This consideration was reviewed in some detail and documented in a memo to the City dated February 8, 2018 – this memo is included as Appendix C to this report. The memo concludes that access to Second Line would not be possible without a significant reconstruction of Second Line and possibly the Great Northern/Second Line intersection. A longer term solution for access to the south would better be achieved by pursuing extensions to Industrial Park Crescent as discussed in this report.

5. Recommendations

In order to address the operational issues at the Second Line/Great Northern Road intersection, the following actions are recommended:

- Continue with the implementation of the Sackville Road North Extension to Third Line (currently planned for construction) to relieve congestion on Great Northern Road.
- Completion of an Environmental Assessment (Schedule C) for a secondary road system connecting the commercial/industrial areas between Sackville Road, Second Line and Great Northern Road.
- If redevelopment occurs in the area west of Old Garden River Road behind the commercial development (e.g. Walmart and Home Depot), explore opportunities to connect an access road from the commercial development to Old Garden River Road and subsequently remove the skewed intersection at Second Line/Old Garden River Road. This could be achieved through the Planning Act during the rezoning/site plan planning process.
- Completion of an Environmental Assessment for the Willow Avenue extension (lower priority).

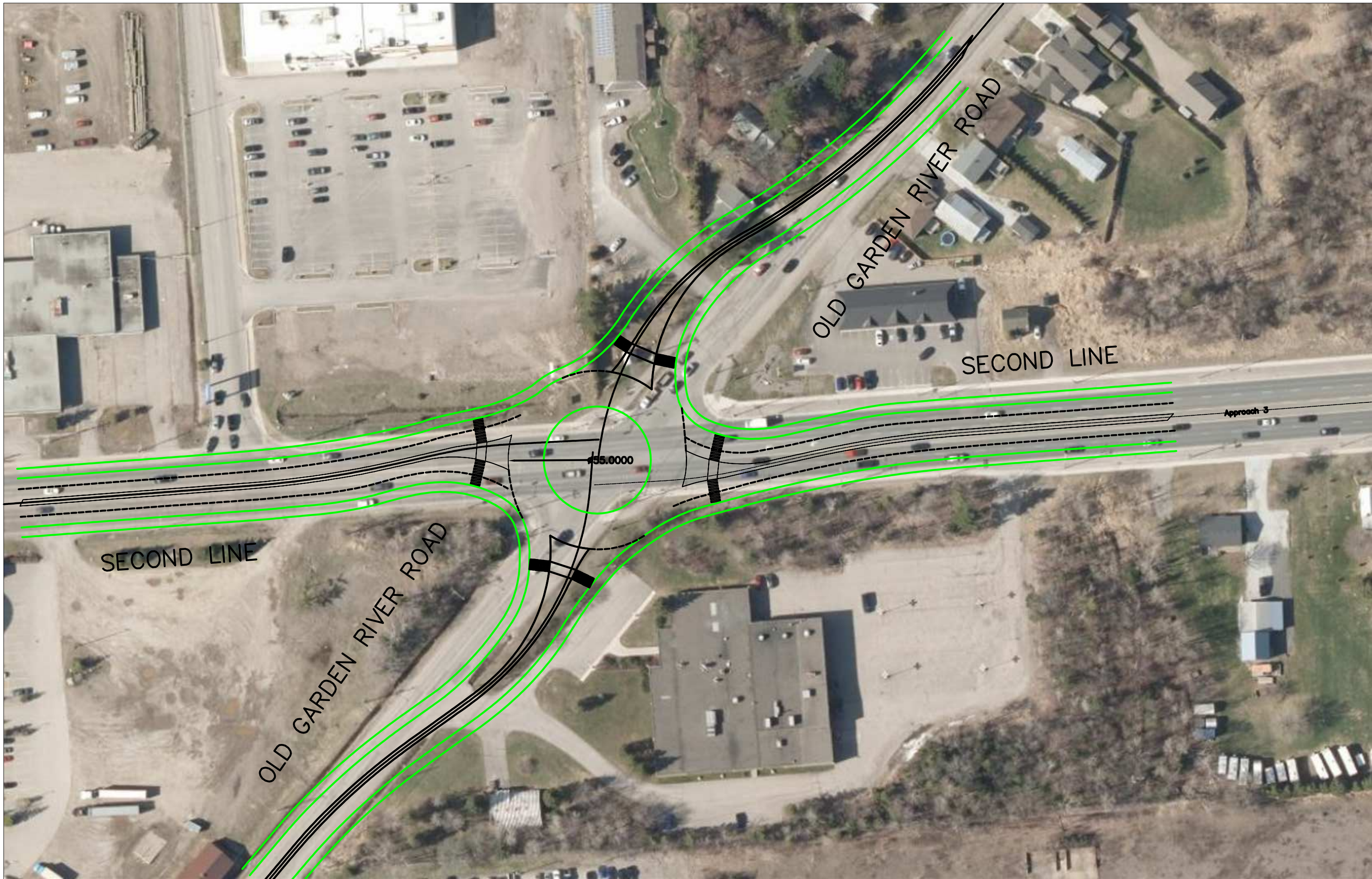
The recommended road network is illustrated in Figure 19.



*A number of east-west connections between Sackville Road and Industrial Park Crescent are potentially feasible. Two such connections are desirable.

Figure 19: Recommended Road Network

APPENDIX A: SINGLE ROUNDABOUT PRELIMINARY CONCEPT DRAWINGS



OLD GARDEN RIVER ROAD

SECOND LINE

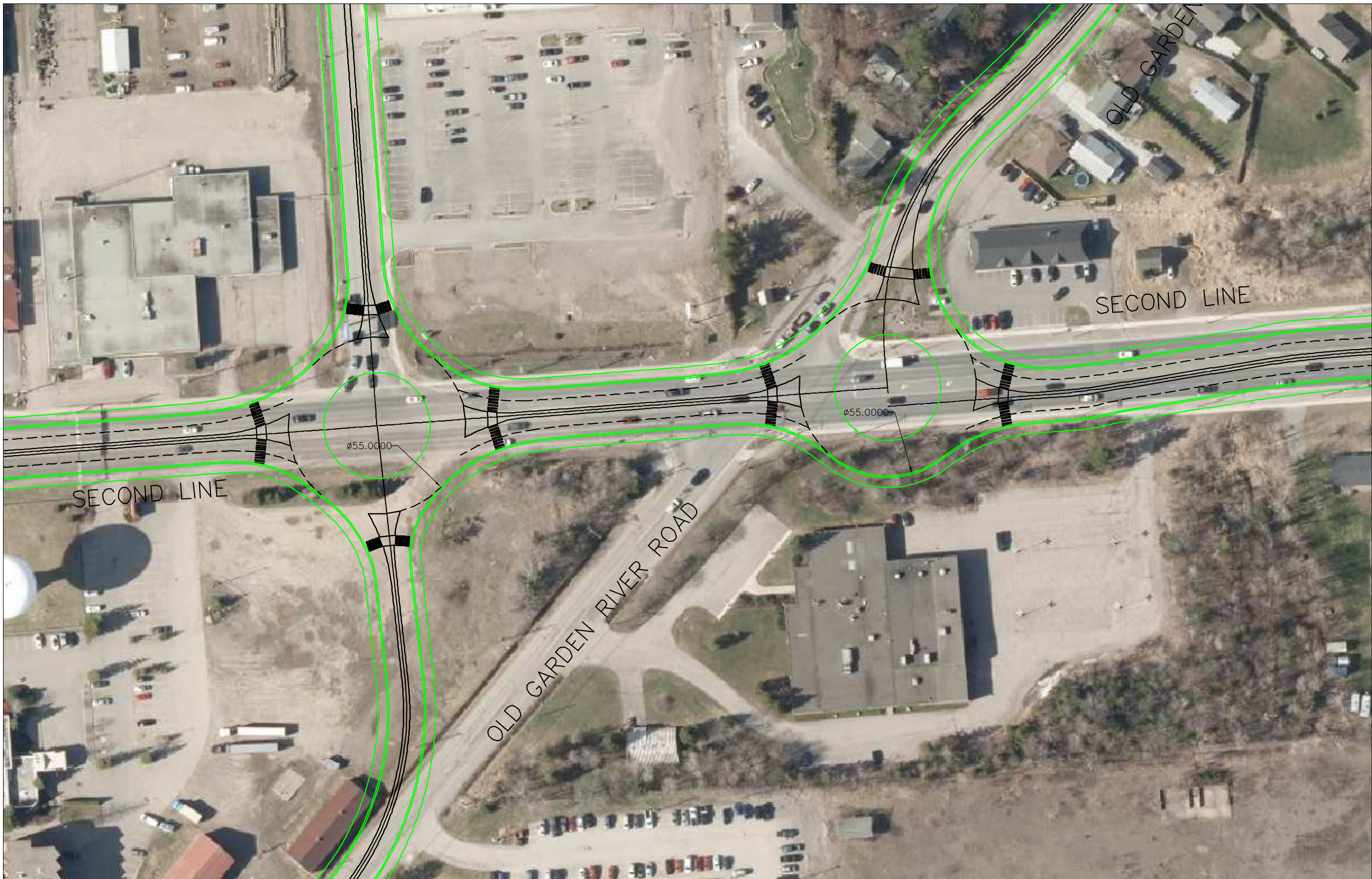
Approach 3

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SECOND LINE

OLD GARDEN RIVER ROAD

APPENDIX B: DOUBLE ROUNDABOUT PRELIMINARY CONCEPT DRAWINGS



APPENDIX C: DEVELOPMENT ACCESS MEMORANDUM

MEMO

TO : Don McConnell, City of Sault Ste. Marie
FROM : Stephen Keen, CIMA+
DATE : February 8, 2018
SUBJECT : Shopping Centre Access to Second Line

INTRODUCTION

CIMA+ was asked to review the potential safety implications of a proposed new driveway access on the north side of Second Line, between driveways for Home Hardware and Petro Canada which is just west of the Second Line/Great Northern Road intersection.

EXISTING CONDITIONS

In the northwest corner of the Second Line/Great Northern Road intersection there is a southbound channelized, Yield-controlled right-turn lane with an acceleration lane (~60 metres) and taper (~60 metres) to allow vehicles turning right to travel with minimal delay and also to accelerate onto Second Line. The intersection is part of the Trans-Canada Highway and was likely designed to MTO standards of the day. Right-turn channelizations are common on high capacity/high speed roadways and increasingly avoided in urban areas as they tend to be less safe for pedestrians.

The Petro Canada access is located within the acceleration lane, and the Home Hardware entrance is located within the taper. This means that vehicles making the right turn are accelerating to merge with westbound traffic on Second Line while traffic is turning out of the two driveways. Typically, if such a situation exists (which is fairly common for gas station driveways), driveway left-turns are restricted through the construction of a median on the adjacent road.

The existing driveways for Home Hardware and Petro Canada are shown in **Figure 1** along with the proposed Shopping Centre driveway access.

TRAFFIC CONFLICTS

Conflict points at driveways are points at which vehicle paths routinely cross, merge or diverge as they enter or exit the driveways. The total number of conflict points at a driveway depend upon geometric conditions. Crossing conflicts are the greatest concern as they have more potential to result in injury collisions; merging conflicts can either result in injuries (although with less potential than crossing conflicts) or vehicle damage; while diverging present the lowest potential for injury collisions.

The following is a summary of the number of crossing points at the subject driveways, for existing conditions, for the shopping centre added driveway on Second Line, and for the shopping centre added driveway plus a median constructed on Second line.

➤ **Existing Conditions**

Figure 2 illustrated the conflict points of existing traffic movements (without the proposed driveway). This diagram illustrates a total of 31 conflicts consisting of:

- 12 crossing;
- 10 merging; and
- 9 diverging.

This illustrates an existing condition that is far from ideal, particularly as 2 of the crossing conflicts are triple lane crossings with 11 conflicts involving accelerating traffic that has just turned the corner.

➤ **Conditions with added all-turns driveway**

Figure 3 demonstrates the conflict points of traffic movements with the proposed driveway accommodating all-turns. This diagram illustrates a total of 51 conflicts consisting of:

- 23 crossing;
- 16 merging; and
- 12 diverging.

With a new all-turns driveway, the number of conflict points increases considerably, with 23 crossing conflict points, including 3 triple crossing conflicts and 17 conflicts involving the accelerating turning traffic. This condition would be highly undesirable.

➤ **Conditions with added driveway and median constructed**

Prohibiting left turns by adding a median on Second Line in front of the Petro Canada and proposed shopping centre driveway would reduce the conflicts to a level similar to existing conditions. It would also have a slight improvement compared to existing condition, reducing the number of triple lane crossing conflicts to only 1. **Figure 4** demonstrates the conflict points of traffic movements with the proposed driveway. This diagram illustrates a total of 33 conflicts consisting of

- 11 crossing;
- 12 merging; and
- 10 diverging.

For this option, it should be noted that a median would be necessary in order to deter drivers attempting a left turn in and out of the two driveways. It should also be noted that Petro Canada has no turn restrictions on its existing driveway.

➤ **Conditions with Right Turn Acceleration Lane removed (with full-turns access to Shopping Centre)**

There is a potential to reduce conflicts if the acceleration lane of the Great Northern Road/Second Line intersection is removed. **Figure 5** demonstrates the conflict points of traffic movements with the proposed all-turns driveway. This diagram illustrates a total of 32 conflicts consisting of

- 13 crossing;
- 11 merging; and
- 8 diverging.

While the conflicts are somewhat similar to existing conditions, the number of triple lanes crossings still increase to 3.

➤ **Conditions with Right Turn Acceleration Lane removed (right in/right out access to Shopping Centre)**

There is a potential to further reduce conflicts by combining the acceleration lane removal and restricting turns to right in/right out only at the proposed Shopping Centre. **Figure 6** demonstrates the conflict points of traffic movements with this option. This diagram illustrates a total of 21 conflicts consisting of

- 6 crossing;
- 8 merging; and
- 7 diverging.

This is a significant reduction in crossing conflicts in particular and the number of triple lanes crossings remains at 2.

FINDINGS

- The existing intersection configuration of Second Line/Great Northern Road (GNR) allows for the southbound right turn moment to be taken without stopping and encourages acceleration upon exit in front of two existing and a third proposed driveway to a Shopping Centre.
- The existing driveway configuration is far from ideal in that 31 turning conflicts exist as a result of the two driveways and their proximity to the GNR/Second Line intersection and the associated acceleration lane. If possible, a third entrance in close proximity to the existing driveway and a major intersection should be disallowed.
- If an all-turns access to the proposed Shopping Centre was added, the number of turning conflicts would nearly double to 51. A full-turns driveway for the Shopping Centre would be unacceptable and contribute to a significant increase in the potential for collisions.

- If a median was constructed from the GNR/Second Line intersection westerly to the proposed Shopping Centre entrance to allow right turn access only to/from the Shopping Centre, the number of conflicts would increase slightly; however, this would impact on the existing Petro Canada driveway.
- Removal of the westbound acceleration lane from the GNR/Second Line intersection while allowing a full turns access into the Shopping Centre would maintain the number of conflicts at a similar level to existing conditions; however, it would increase the more risky 3-lane-crossing conflicts.
- A combination of removal of the westbound acceleration lane from the GNR/Second Line intersection while allowing only right turn in/out access to the Shopping Centre would significantly lower the number of conflicts by one-third.

CONCLUSIONS

1. Disallowing a third access in such a short space between the Home Hardware driveway and the GNR/Second Line would be the best response to the proposed development application; however, as access to Second Line is considered to be important, a restricted right in/right out access could be considered on a short term basis.
2. A satisfactory Shopping Centre driveway design is required to ensure left turns are prohibited and that it does not impact on the two adjacent driveways.
3. In order to mitigate the problems caused by the addition of this third driveway, the City can investigate shortening or removal of the westbound acceleration lane on Second Line in order to reduce the additional conflicts caused by the third driveway.
4. A preferred longer term strategy would be to provide Shopping Centre access to Second Line via a southerly extension of Industrial Park Crescent. This would make the third driveway redundant and would allow its closure once such a new collector road access is open. This road extension is currently under consideration by City staff at this time.

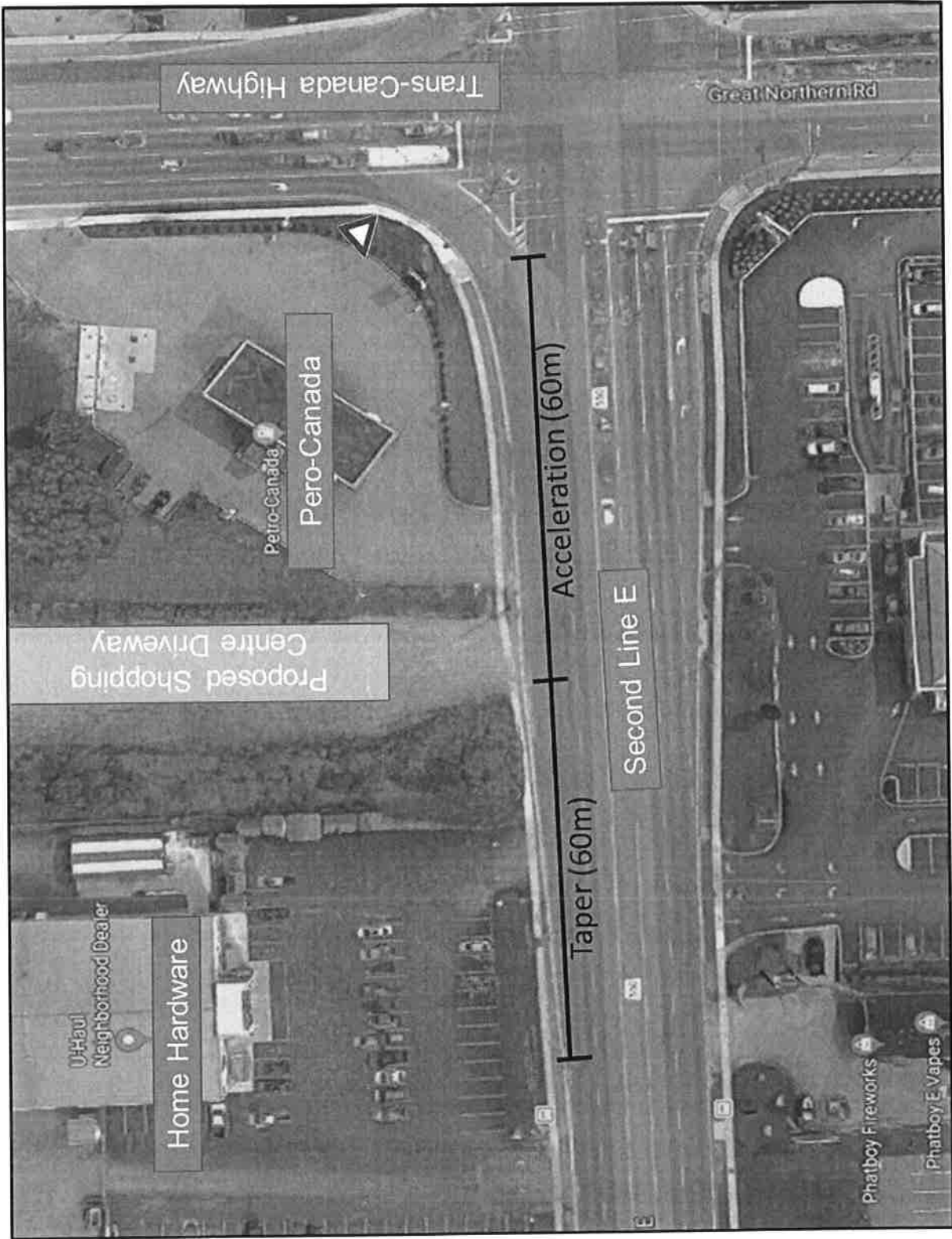


Figure 1: Study Area

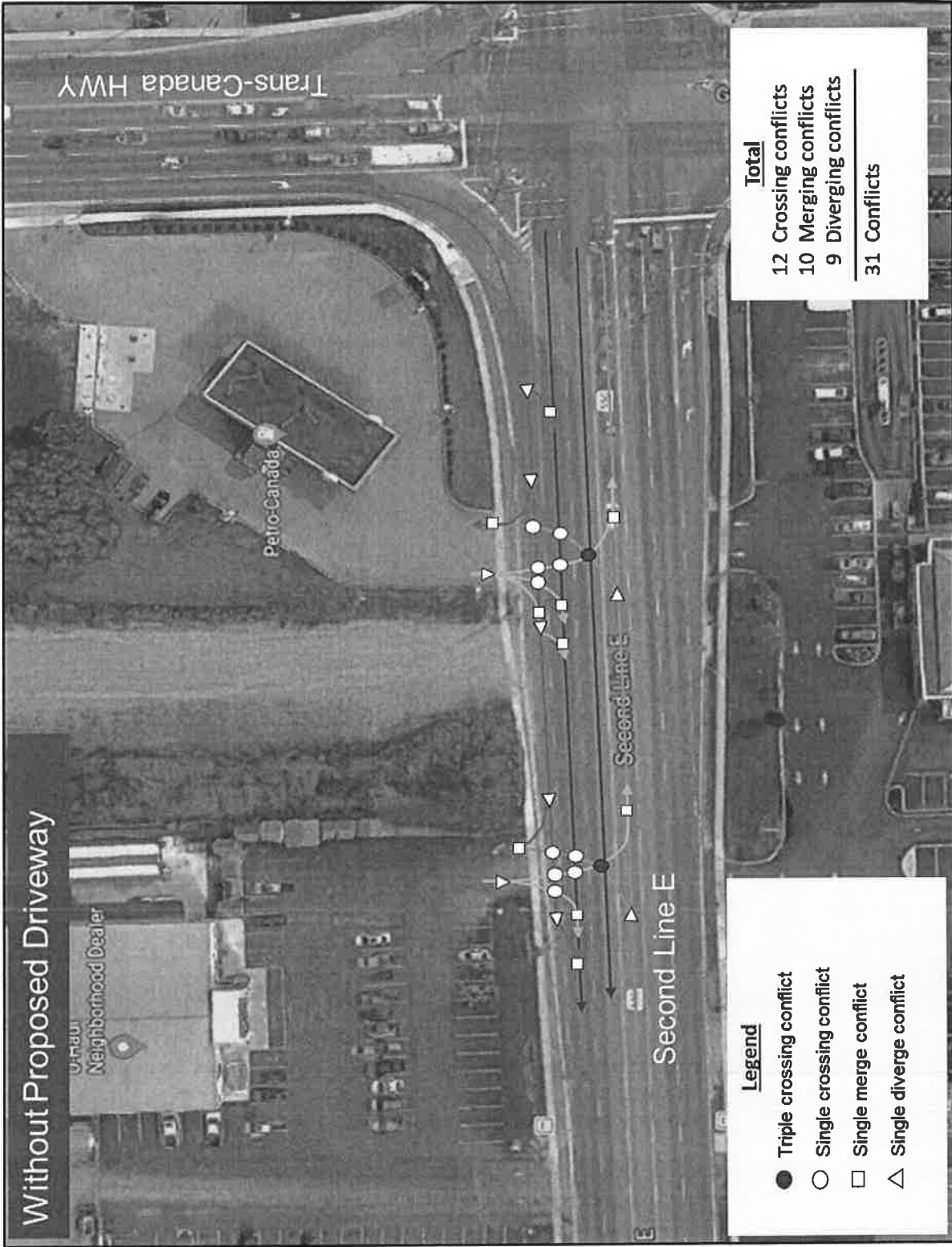


Figure 2: Conflict diagram - Existing Movement

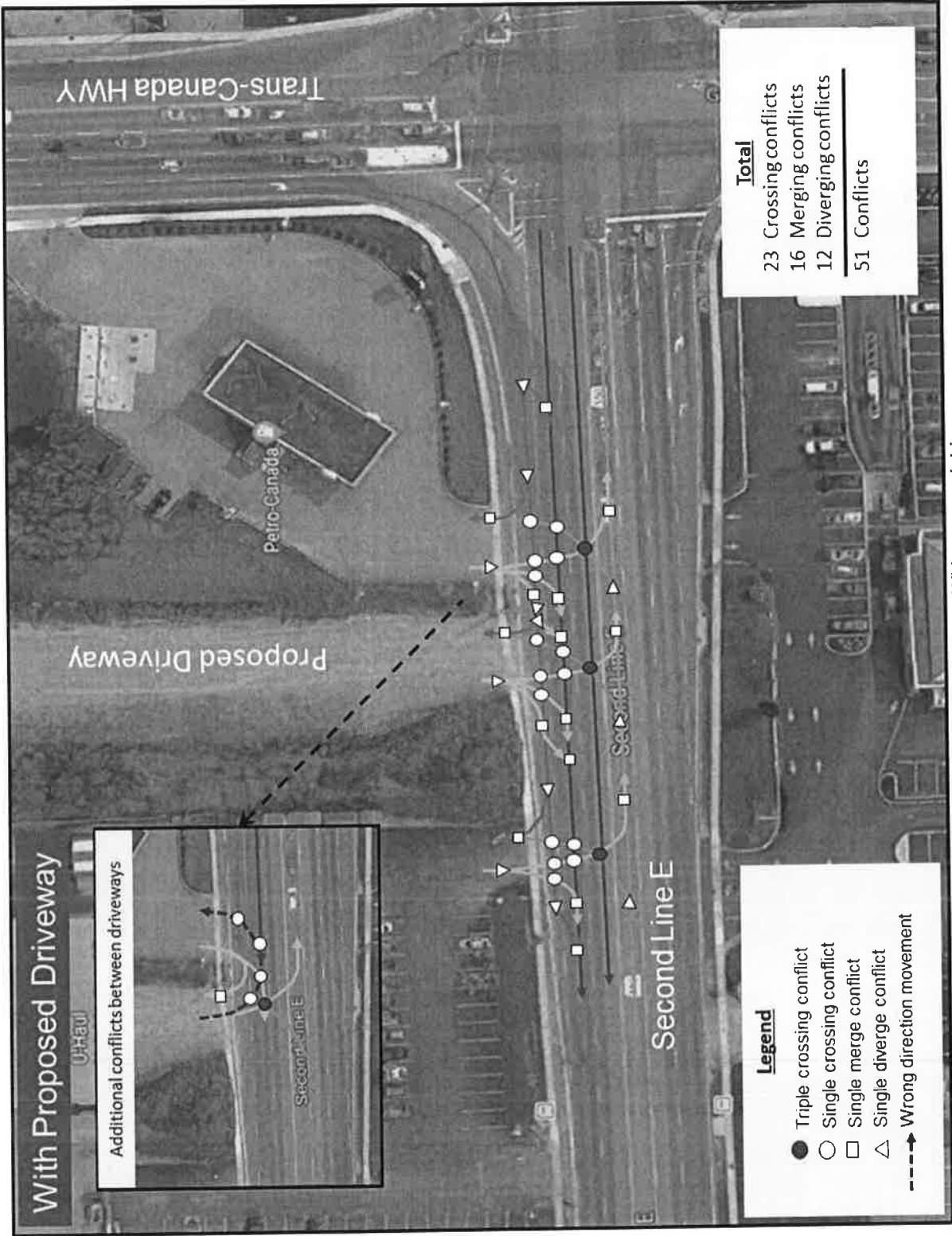


Figure 3: Conflict diagram - With proposed driveway

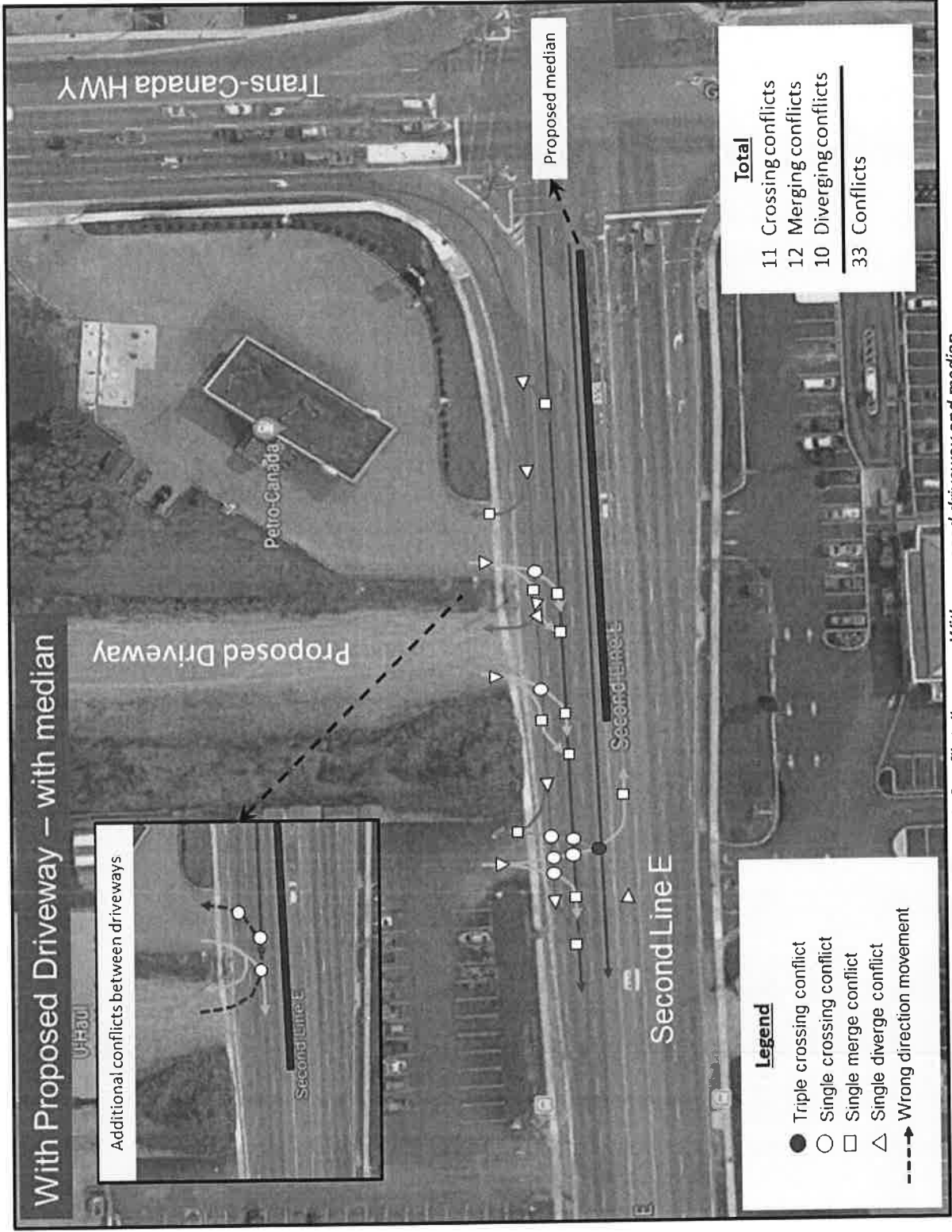


Figure 4: Conflict diagram - With proposed driveway and median

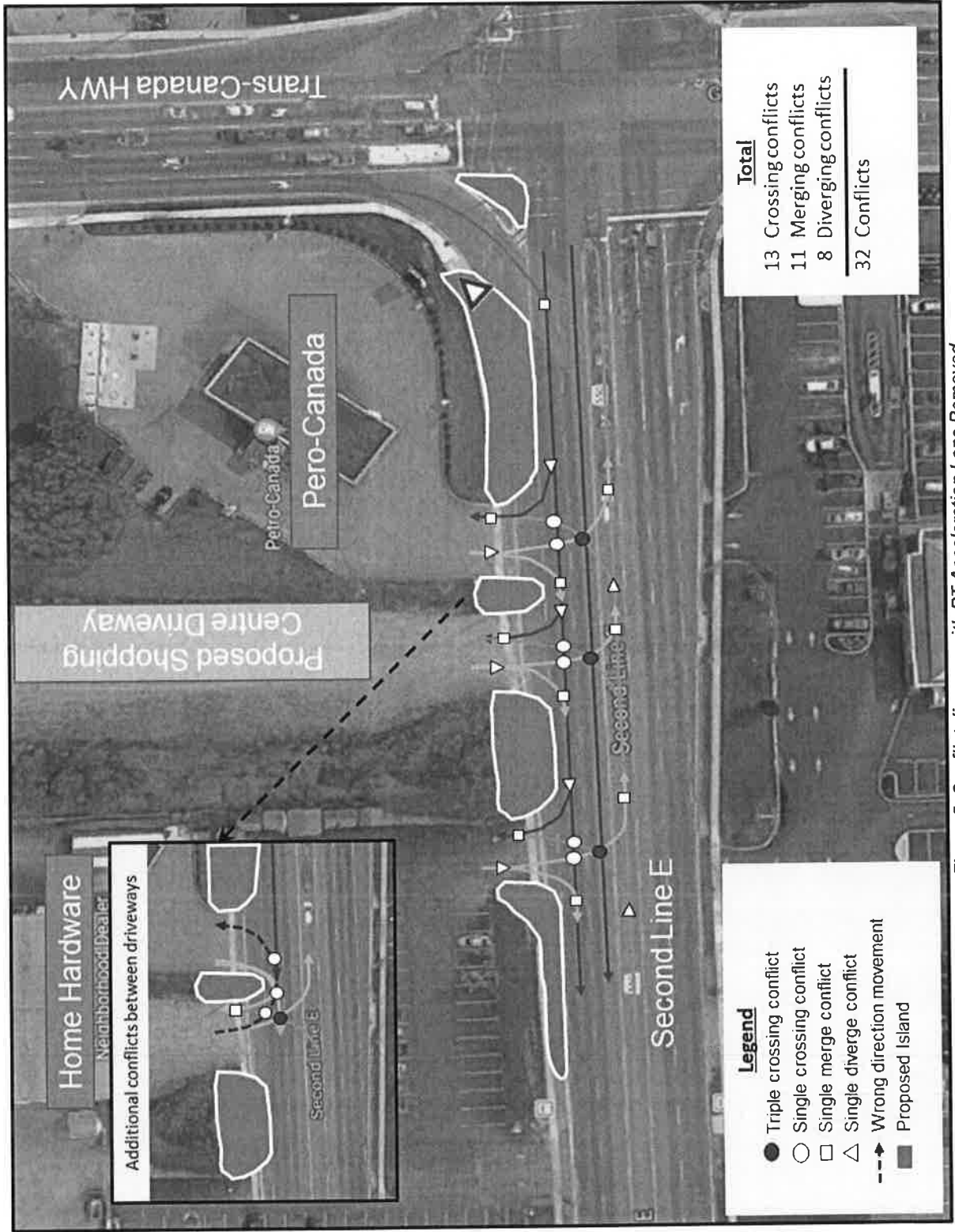


Figure 5: Conflict diagram with RT Acceleration Lane Removed

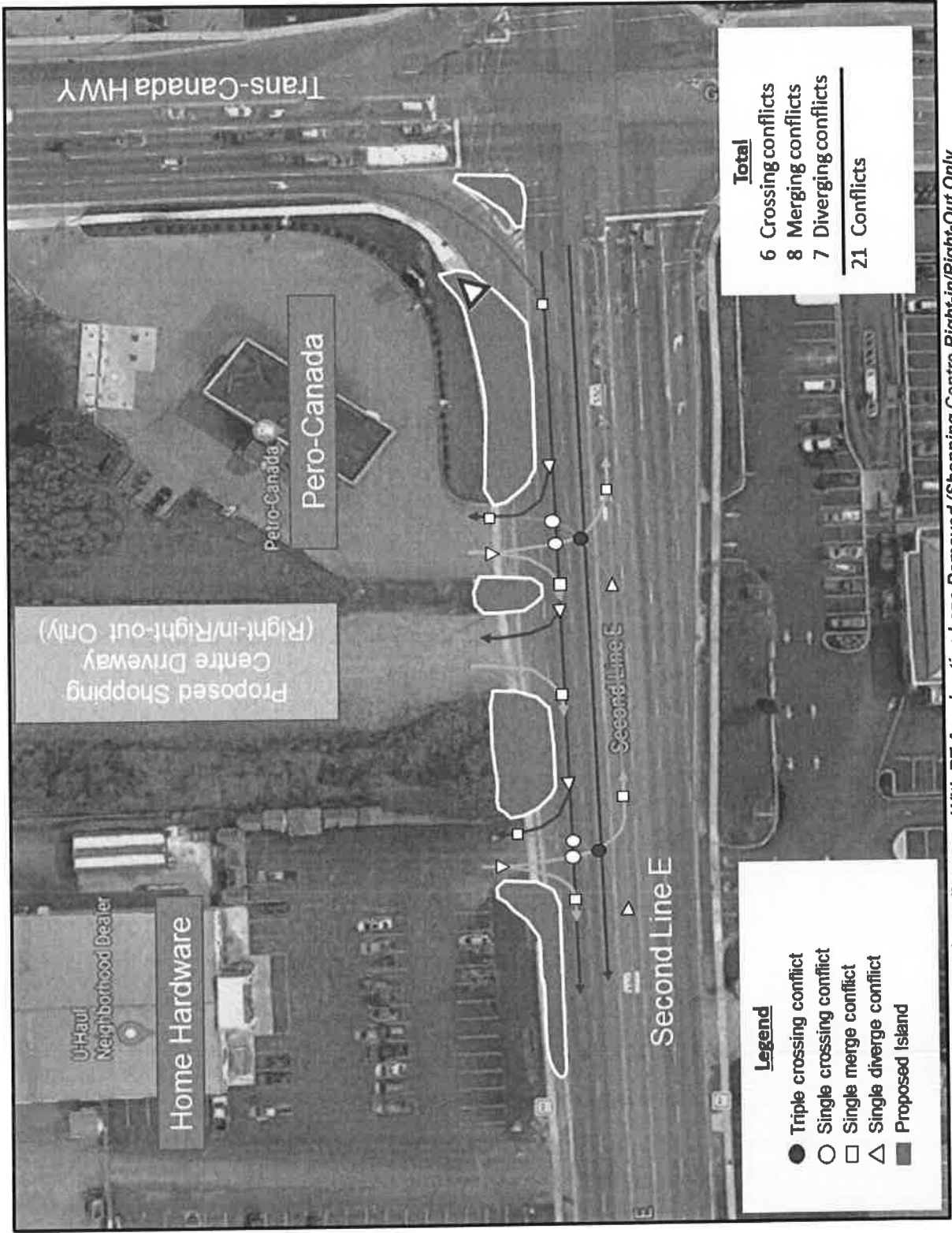


Figure 6: Conflicts diagram – With RT Acceleration Lane Removed (Shopping Centre Right-in/Right-Out Only)



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