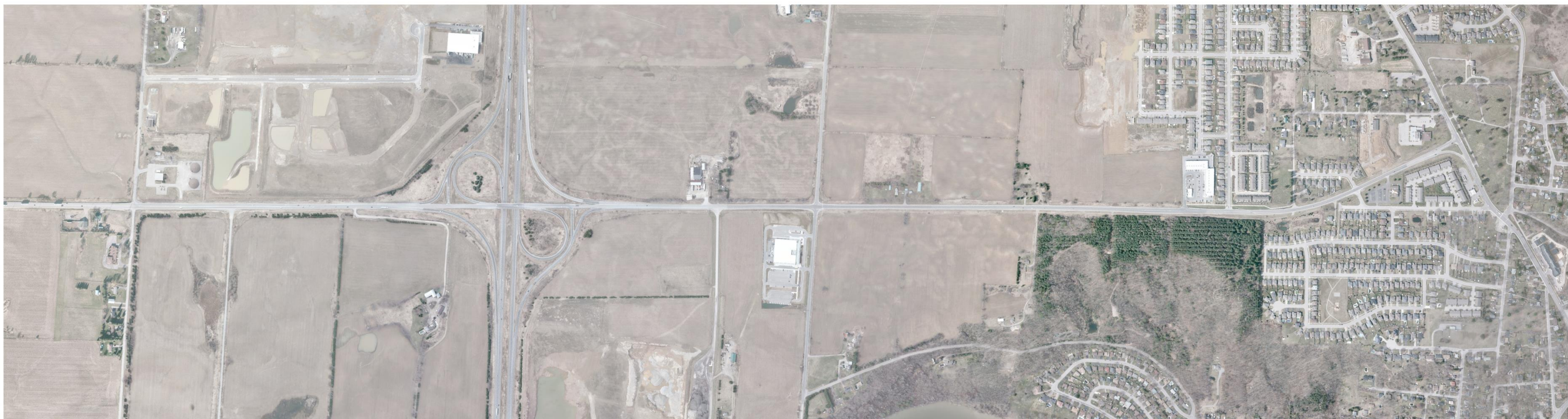




Rest Acres Road, Highway 403 to King Edward Street

Class Environmental Assessment Addendum



Prepared for: The County of Brant

January 2018

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1.0 INTRODUCTION

BT Engineering Inc. (BTE) was retained by the County of Brant to assist in the preparation of a corridor preliminary design plan for Rest Acres Road and Class Environmental Assessment (Class EA) Addendum to reflect changes in previous Class EA's completed in the corridor. The project location is near the former Town of Paris in the County of Brant. The project limits are the Highway 403/Rest Acres Road interchange northerly to the King Edward Street intersection, as illustrated in **Figure 1**.

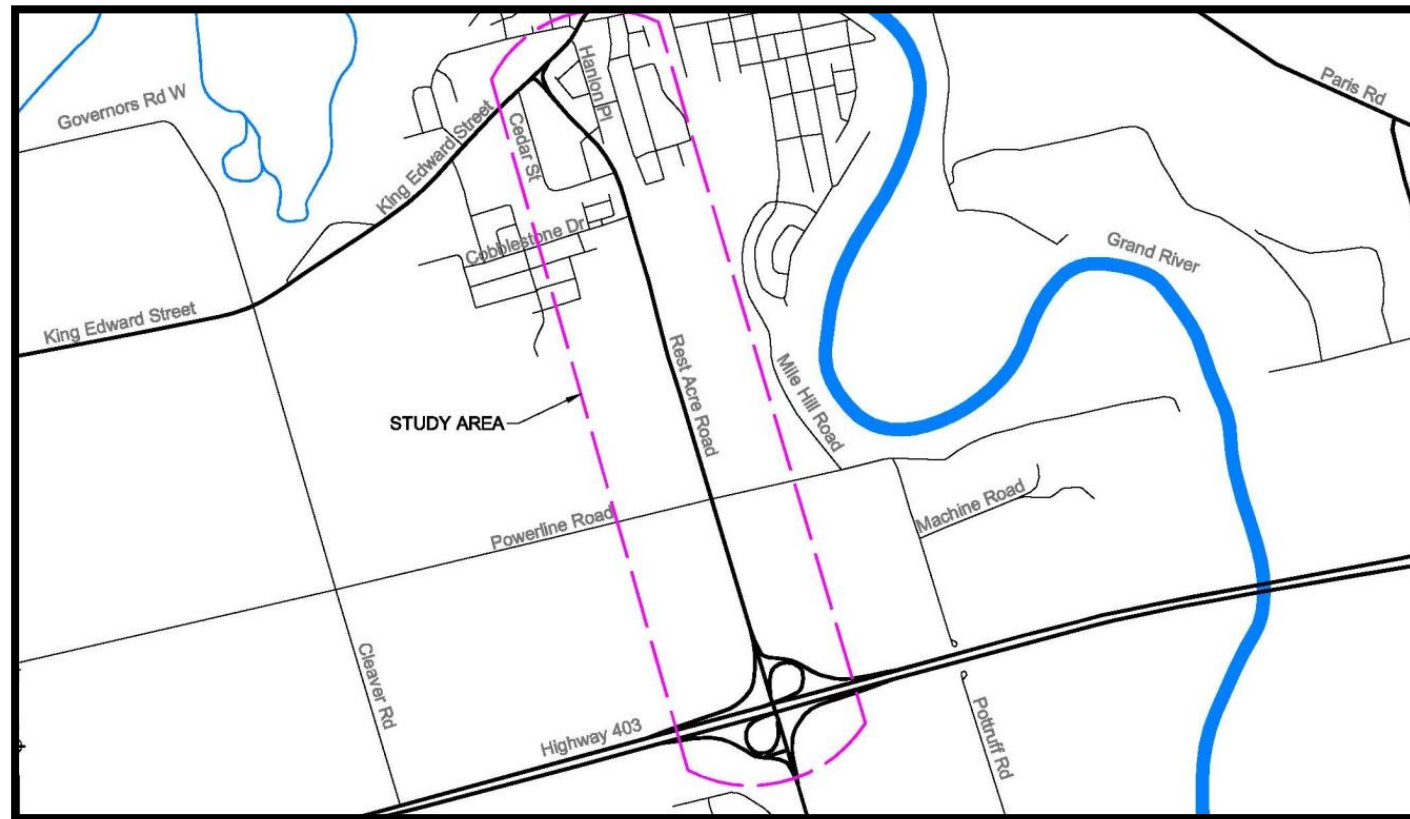


Figure 1: Study Area

1.1 Background

The County of Brant has previously completed a series of technical investigations and studies that have developed the land use and transportation plans in the study area.

These include:

- 1) The Transportation Master Plan (TMP) is a planning tool utilized by the County which follows a prescribed process under the Municipal Class EA. This planning process defines Regional level transportation needs to service the land use plan of the County. The County has maintained and updated TMP's and these previous studies and public consultation have established the role of Rest Acres Road and the definition of a parallel regional truck route that will utilize a new Highway 403 interchange to the west (on Bishopsgate Road). The

Bishopsgate Road interchange and truck route is being planned under a separate Class EA study with a planned completion in the winter of 2018. The most recent update of the County's TMP was in 2016. TMP's are subsequently reflected in updates to Official Plans.

- 2) The Official Plan (OP) describes local policies on how land in the community should be used. It is prepared with input from the public to help ensure that future planning and development meets the community's needs. It deals with issues including: where new housing, industry, offices and development will be; services such as roads, watermains, sewers, parks and schools to support these land uses; and in what order parts of the community will grow. The Official Plan is a living document that is updated with amendments and regular reviews. The current Official Plan was updated in 2015. The Paris Area development plan is illustrated in the OP Schedule A-1.

- 3) The "Rest Acres Road from King Edward Street to Highway 403 Class Environmental Assessment (Class EA), August 2012", as shown in **Figure 2**, had recommended widening Rest Acres Road to a 4-lane urban cross-section from King Edward Street to Powerline Road and to a 4-lane rural cross-section from Powerline Road to the north ramp terminal at Highway 403. The recommended plan included multi-use trails on both sides of Rest Acres Road north of Powerline Road and no sidewalks or trails along the rural section from Powerline Road to Highway 403. The study also recommended that:
 - Traffic signals be maintained at the intersection with King Edward Street;
 - Roundabouts be provided on Rest Acres Road at 3 locations: the future intersections with Arlington Parkway, Street H and Street I; and
 - Traffic signals be provided at the intersection with Powerline Road. These traffic signals would require additional turning lanes that would widen Rest Acres Road to 7 lanes on the south side of the intersection and widen Powerline Road to 5 lanes on the east side of the intersection (in front of the Brant Sports Complex).

- Traffic signals be maintained at the intersection with King Edward Street;
- Roundabouts be provided on Rest Acres Road at 3 locations: the future intersections with Arlington Parkway, Street H and Street I; and
- Traffic signals be provided at the intersection with Powerline Road. These traffic signals would require additional turning lanes that would widen Rest Acres Road to 7 lanes on the south side of the intersection and widen Powerline Road to 5 lanes on the east side of the intersection (in front of the Brant Sports Complex).

The 2012 Class EA also assumed that the Pit Haul Road would ultimately be closed; however, a potential development has recently proposed that the Pit Haul Road remain open and be controlled with a roundabout.

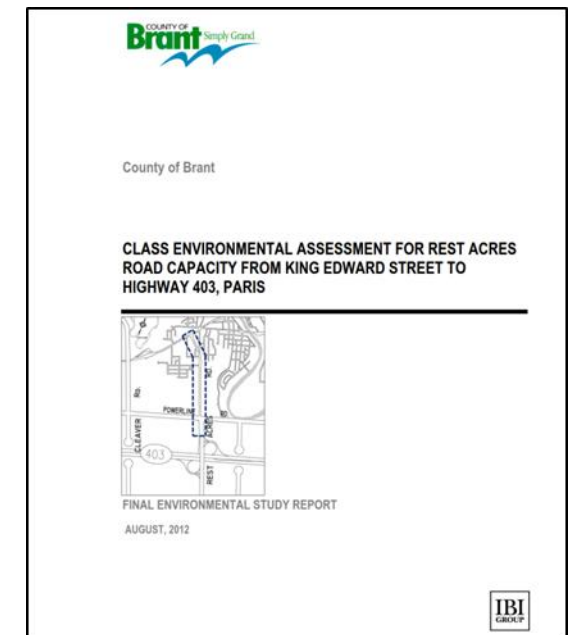


Figure 2: 2012 Rest Acres Road Class EA

- 4) The "Brant 403 Business Park Long-Term Traffic Impact Study, May 2015". The traffic study previously completed for the County of Brant addressed existing and long term impacts of traffic growth resulting from the continued development of the business park, the opening of several new gravel pits in the area and future development in the Southwest Paris Settlement Area. It identified the need for additional improvements to the Highway 403 interchange. It also reaffirmed the recommendations of the TMP and the 2012 Class EA, to avoid the need for further widening of Rest Acres Road to 6 lanes with the provision of a new interchange at Bishopsgate Road.

- 5) The “Powerline Road Class EA, August 2016” re-evaluated the improvement alternatives for the Rest Acres Road and Powerline Road intersection and recommended roundabout intersection control.
- 6) The “Harmonized Class EA for Operational Improvements to the Highway 403/Rest Acres Road/Highway 24 interchange” satisfying the MTO’s Class EA and the Municipal Class EA (January 2017). This study recommended upgrades to the existing ramp terminals as roundabouts.
- 7) The 2017 functional planning for entrance control for development of the Gurney lands (commercial development lands between Highway 403 and Powerline Road on the west side of Rest Acres Road) in 2017. This review and traffic modelling demonstrated roundabout intersection control would perform with acceptable traffic level of service with no impact on the MTO’s interchange. MTO will have responsibility for approval of all access within the corridor control zone of the freeway.

1.2 Summary of Transportation Plan (Previous Studies)

A total of 11 intersections are included in the project limits. The 11 intersections are illustrated in **Figure 3**. These intersections can be broken down into respective groups by their governing traffic control features which previously included 6 roundabouts, 2 signalized intersections and 3 stop-controlled intersections (including 2 right-in/right-outs). Based on previous Class EA studies, the County and MTO have the approval and environmental clearance to deliver the project(s) in this corridor.

The previous Class EA studies have recommended road widening for a future 4-lane Urban Arterial Divided Roadway classification that includes roundabout designs at several intersections along Rest Acres Road (Highway 403 Interchange, Powerline Road, Arlington Parkway and 2 other previously unnamed future intersections). This Class EA Addendum has incorporated the previous study recommendations and current development proposals along the corridor. The purpose of this Class EA Addendum is to define design standards, roadway elements, and the road right-of-way to allow development in the corridor and provide certainty to adjacent landowners for land use development. Significant changes from previous Class EA studies illustrated in **Figure 3** are: the removal of the proposed roundabout north of Powerline Road at Edgar Place; addition of a new roundabout north of Edgar Place (Lydia Lane); removal of the previous Vic Chambers Place roundabout; restriction of left turn access at 1084 Rest Acres Road; a new roundabout at Cobblestone Drive and closure of Cedar Street at Rest Acres Road. The major benefits of this approach include improved safety and traffic operation.

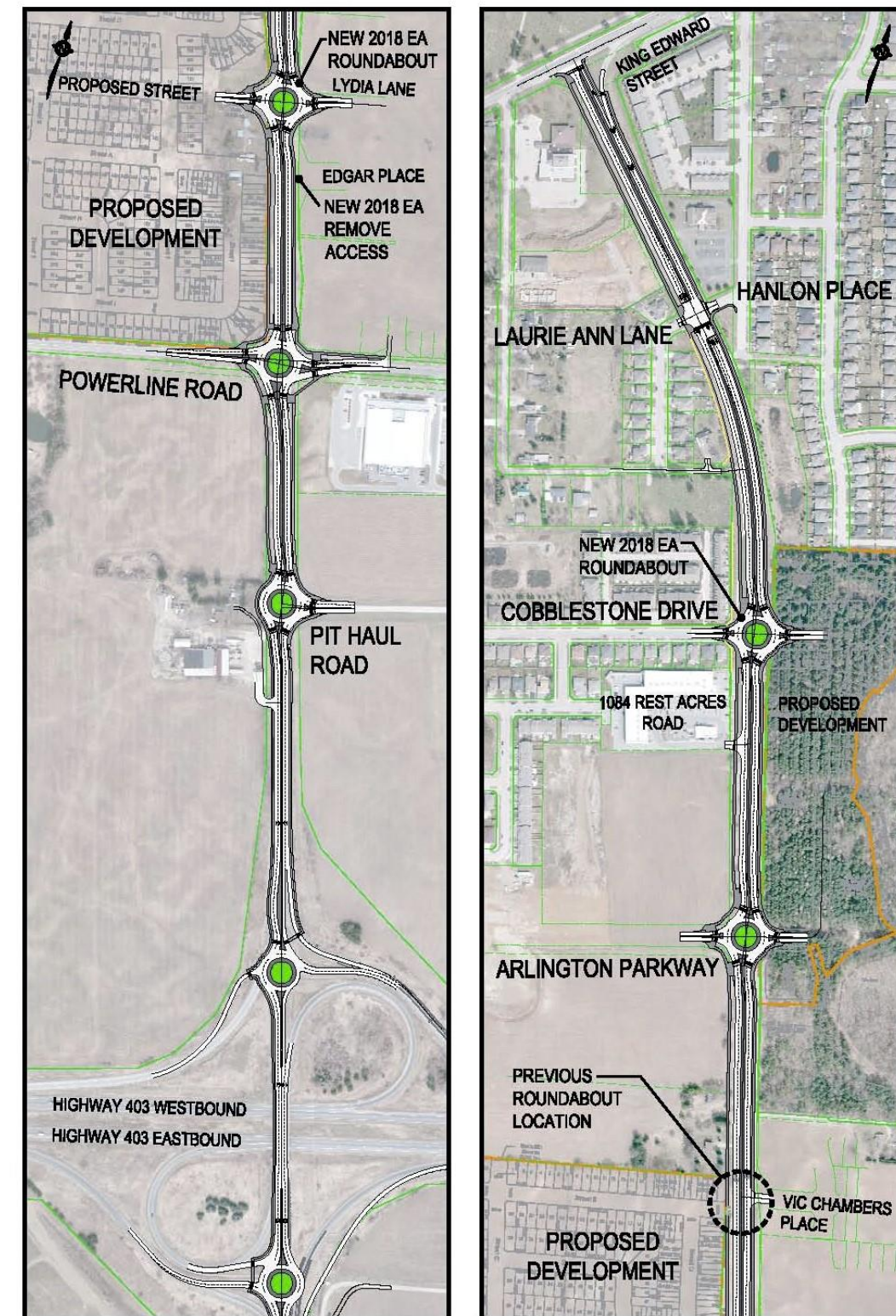


Figure 3: Eleven Intersections

2.0 CLASS EA ADDENDUM PURPOSE

The purpose of this report is to develop the geometric design for the Rest Acres Road corridor. The Class EA Addendum will identify a consistent design standard along the corridor, confirm the property requirements of the approved 2012 Class EAs for Rest Acres Road and Powerline Road and provide the County of Brant with a planning tool for long range property protection, allowing them to respond to new development proposals as they occur along the corridor.

This report sets out key design requirements including roundabout geometry, design vehicles to be accommodated, signage, pavement markings, utility corridors and right-of-way protection while identifying general lighting and landscaping opportunities.

3.0 PROPOSED MODIFICATIONS FROM PREVIOUS CLASS EA STUDIES

This Class EA Addendum is proposing several modifications to previous Class EA studies completed in the corridor. The proposed modifications presented at the PIC in August 2017 are summarized as:

Rest Acres Road Interchange Class EA

- 1) Temporary ramp closures will be required during construction staging of the roundabouts on Rest Acres Road. This requirement was not described in the Rest Acres Road Class EA Report. See **Appendix B** for the Staging Plan.

Powerline Road Class EA

- 1) No changes

IBI Class EA

- 1) The addition of a roundabout at Pit Haul Road (which requires additional property);
- 2) Right-in/right-out (RIRO) at Edgar Place to replace the roundabout alternative;
- 3) RIRO is recommended for Vic Chambers Place with the roundabout location shifted southerly;
- 4) Property impacts are reduced along the entire corridor by limiting property requirements to one side;
- 5) Staging Plan for 1084 Rest Acres Road Plaza intersection control which includes adjacent Cobblestone intersection. The eight alternatives considered between the Arlington Parkway and Cobblestone Drive to accommodate access to the 1084 Plaza (shown at the Public Information Centre (PIC)) are illustrated in **Figure 4** and **Figure 5**;
- 6) Closure of Cedar Street at Rest Acres Road;
- 7) Intersection pedestrian crossing added at Laurie Ann Lane;
- 8) Noise control abatement measures to mitigate effects to historical residential areas along the corridor; and
- 9) Minor right-of-way widening.

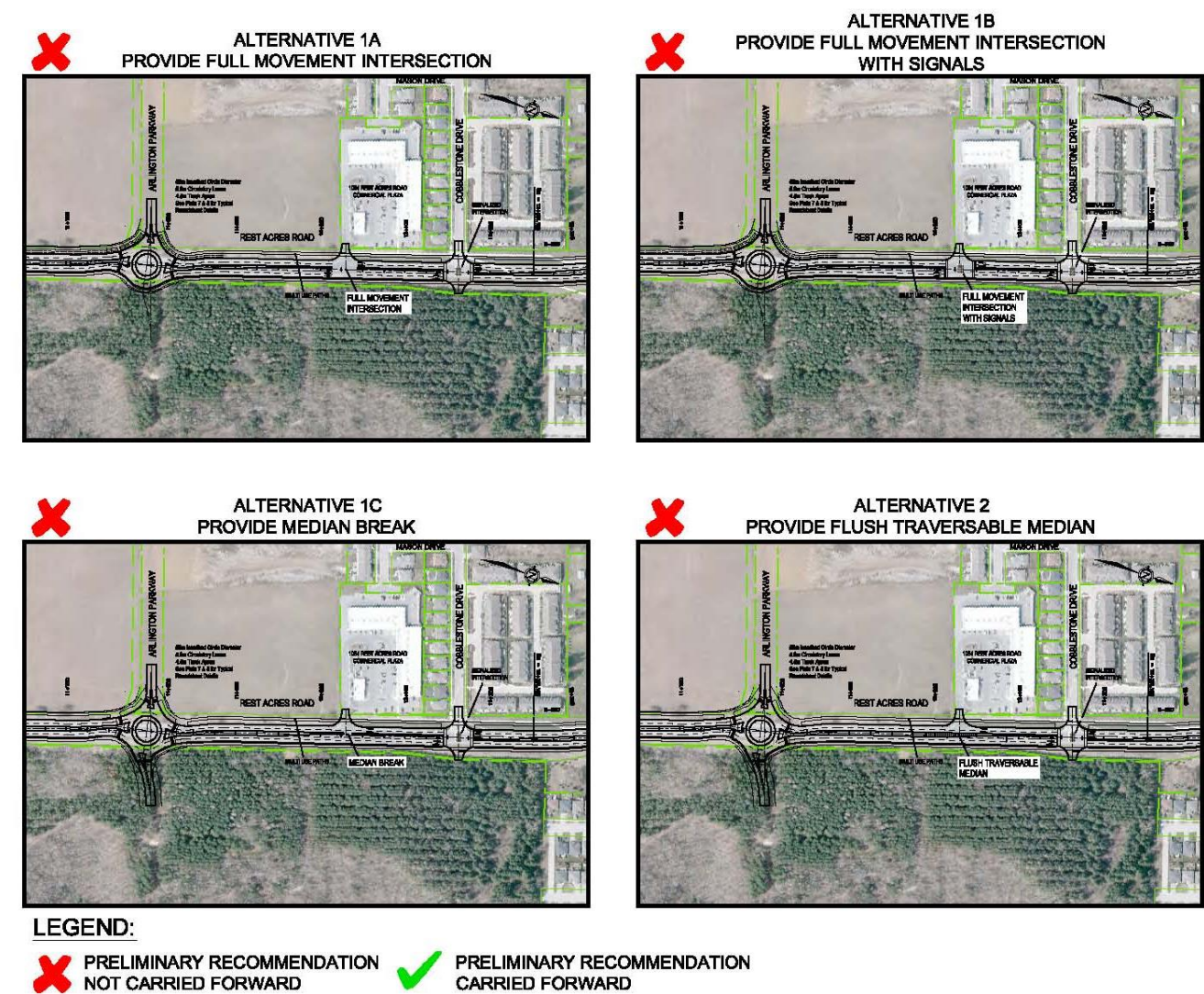
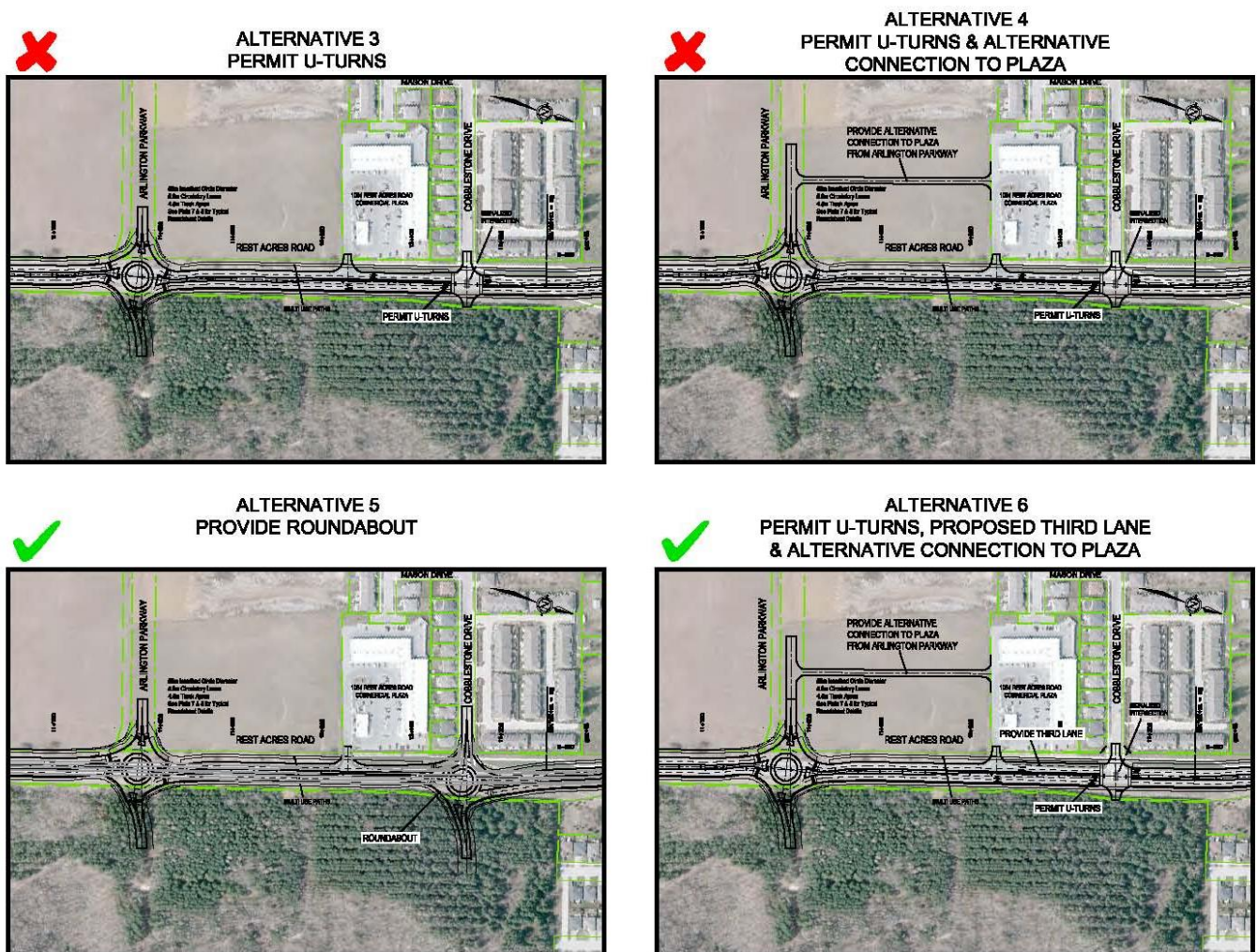


Figure 4: Alternatives 1A-C and 2 shown at PIC



LEGEND:
 ❌ PRELIMINARY RECOMMENDATION NOT CARRIED FORWARD
 ✅ PRELIMINARY RECOMMENDATION CARRIED FORWARD

Figure 5: Alternatives 3-6 shown at PIC

4.0 ASSESSMENT OF ALTERNATIVES

4.1 Commercial Plaza 1084 Rest Acres Road

Eight alternatives were considered between the Arlington Parkway and Cobblestone Drive for access to the commercial plaza at 1084 Rest Acres Road, as illustrated in **Figure 4** and **Figure 5**. The alternatives considered included:

- **Alternative 1A:** Do Nothing: Median break, full movements at unsignalized intersection
- **Alternative 1B:** Full movements with Traffic Signals
- **Alternative 1C:** Median break allows NB left turns (3/4 intersection)
- **Alternative 2:** Flush traversable median
- **Alternative 3:** Permissive U-turns at Cobblestone. Entrance a right-in/right-out
- **Alternative 4:** Permit U-turns at Cobblestone and provide alternative access through commercial property to south
- **Alternative 5:** Roundabout at Cobblestone Drive
- **Alternative 5B:** Roundabout at Cobblestone Drive shifted easterly
- **Alternative 6:** Permissible U-turn at Cobblestone, exclusive auxiliary lane for SB drivers, and a frontage road/internal access road southerly to Arlington Parkway

This initial assessment recommended Alternative 6 and the recommendation was presented at the PIC. Based on comments received at the PIC, two refinements to Alternative 5 were investigated. One refinement was to shift the Cobblestone roundabout easterly to avoid property impacts to existing buildings and change the property acquisition to be from development lands east of Rest Acres Road. This revised Alternative 5 is and is labelled Alternative 5B and is illustrated in **Figure 6**. The second refinement was to accept staging of the access control (delay loss of access) to allow a reduction of business impacts.

The assessment of changes to the commercial entrance at 1084 Rest Acres Road is illustrated in **Table 1**.

Table 1: Modifications to Previous Studies, 1084 Rest Acres Road

	Alternative								
	1A	1B	1C	2	3	4	5	5B	6
Traffic Operation	x	x	-	x	✓	✓	✓	✓	✓
Traffic Safety	x	x	x	x	✓	✓	✓	✓	✓
Property	✓	✓	✓	✓	✓	✓	x	✓	✓
Business	✓	✓	✓	-	-	-	✓	✓	✓
Technical Recommendation	x	x	x	x	x	x	x	✓	x

The staged approach was presented at a meeting with the Plaza owners on September 19, 2017 which is documented in **Appendix D**. A stepped approach to implementing longer term roadway improvements will include:

- a. Long Term Plan: The Class EA Addendum would include the consideration for an offset roundabout at Cobblestone Drive. This avoids the residential properties, improves the access to the 1084 site and would have

land requirements to the east. The 1084 site access would be converted to a right-in and right-out driveway and be bookended with roundabouts to the north and south, and include a joint internal access between commercial lots.

- b. Interim Plan: An interim plan would be implemented that would allow northbound left turns into the site from Rest Acres Road. Exiting traffic would be restricted to right only (southbound) directed to the roundabout. The timeline for the interim period would be for 5 to 10 years based on the following triggers:
 - 1) No changes within 5 years for northbound lefts (unless triggered by 2 injury or 1 fatal type collision)
 - 2) After 5 years the conversion to right-in/right-out would be triggered by the first of the following:
 - Reaching 10 years from the current construction schedule (January 2030)
 - Traffic volumes reaching an AADT of 12500
 - Collisions with one of the following occurring: 1 fatality; or 1 injury type collision; or 2 reported property damage only type collisions. The definition of the intersection would be within 50 m of the centreline of the driveway on Rest Acres Road.

Based on the meeting on September 19, 2017, **the recommended alternative was changed to Alternative 5B**. Alternative 5B is illustrated in **Figure 6** and plates in **Section 12.0**.

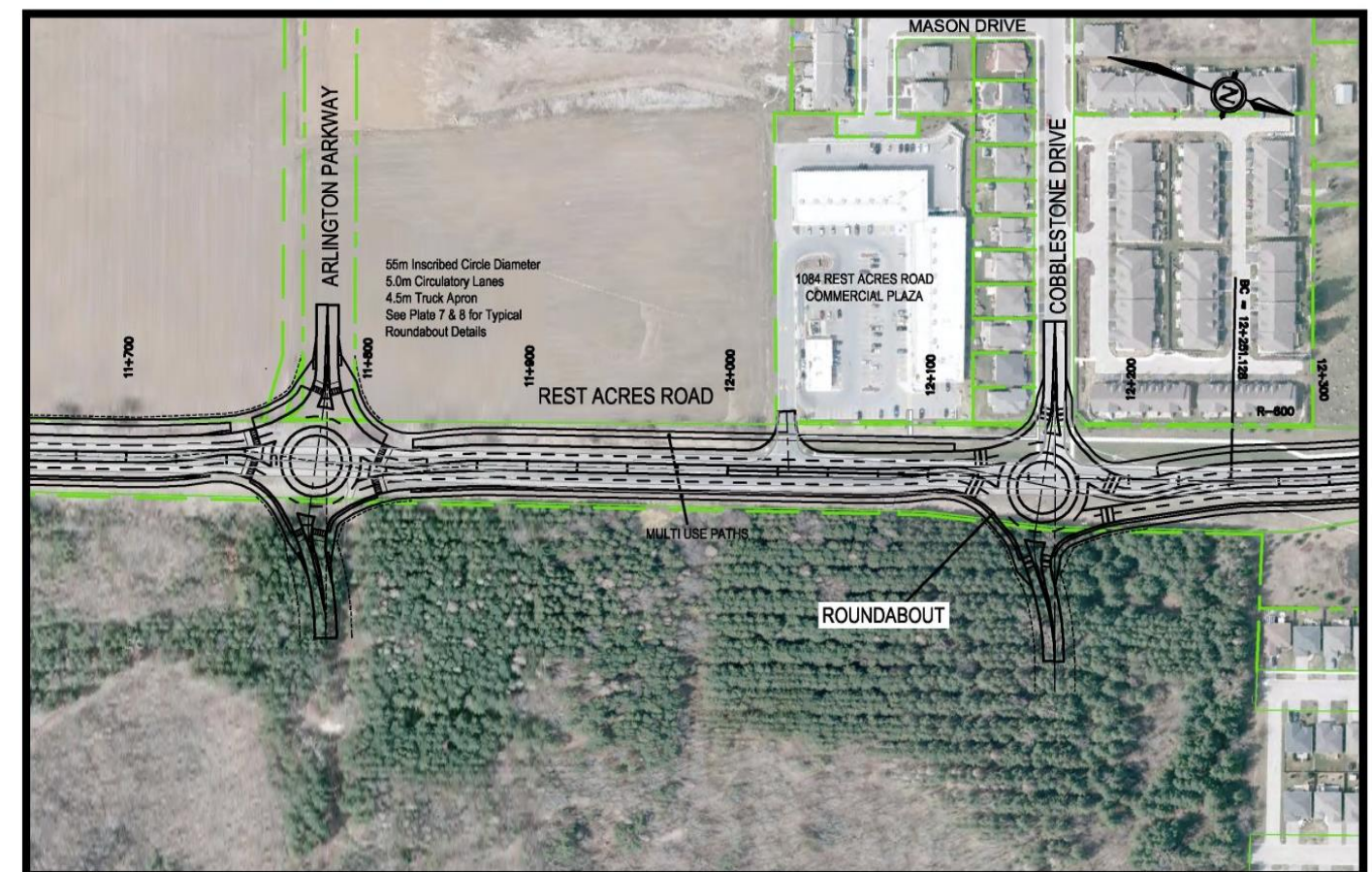


Figure 6: Alternative 5B

4.2 Edgar Place/Vic Chambers Place Access

Following the PIC the landowners, who are developing the adjacent land parcels east and west of Rest Acres Road in the road segment from Powerline Road to Vic Chambers Place, requested consideration of a modification to the location of the Vic Chambers roundabout. This revision would be to shift the roundabout to a location between the former Edgar Place and Vic Chambers intersections (approximate chainage 11+220). The revised roundabout location is illustrated in **Figure 7**. On September 19, 2017 the modified intersection location was discussed at a meeting with the landowners. The updated roundabout location and design have been accepted by the landowners and County and this Class EA Addendum report documents this change as documented in **Appendix D**.

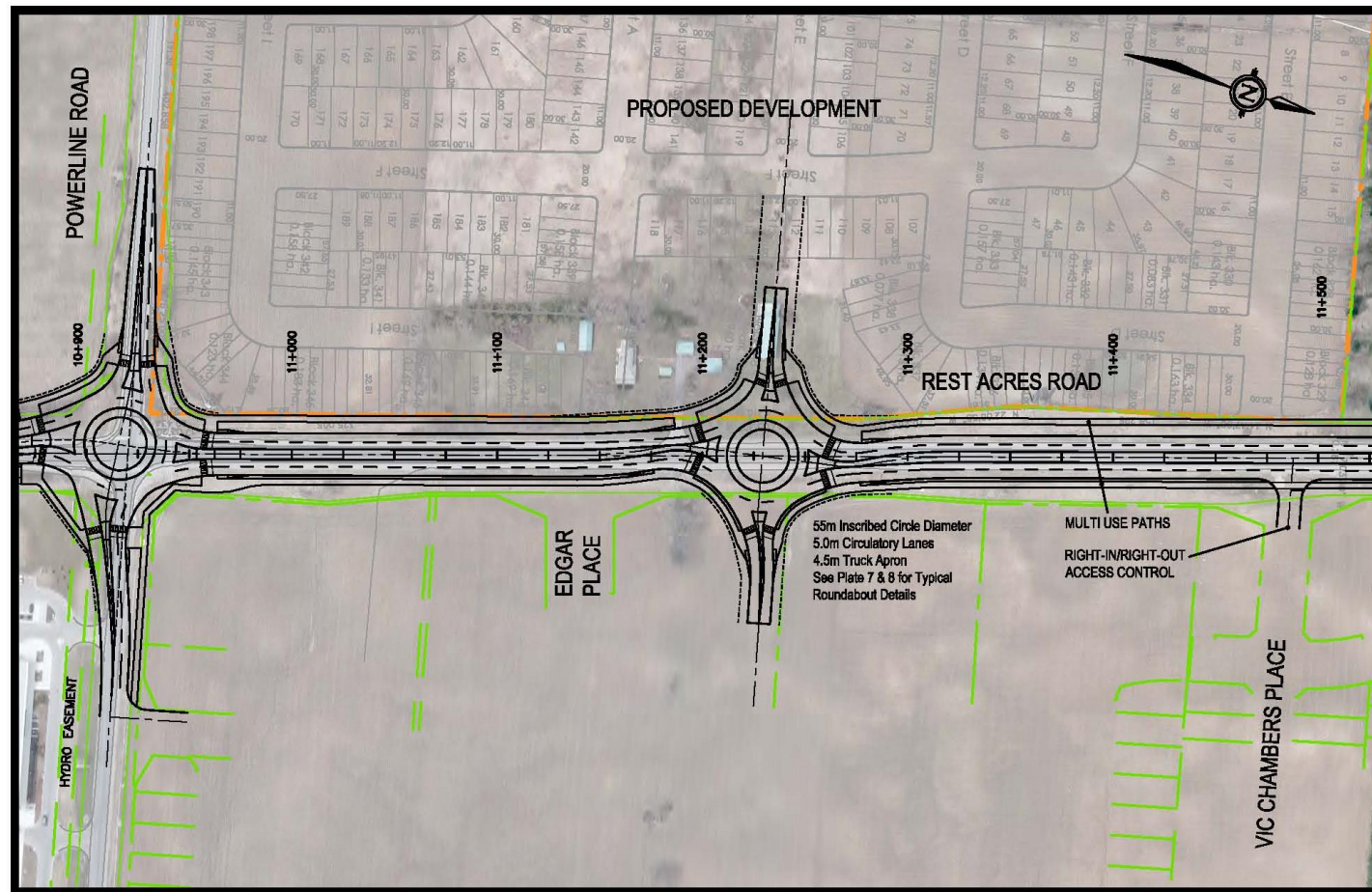


Figure 7: Revised Roundabout Location between Edgar Place and Vic Chambers Place

4.3 Minor Right-of-way and Design Element Modifications

Changes within the County right-of-way can be made by the County without mandatory public consultation and those which change the use and capacity of the road or require land from adjacent land owners or change their access control are subject to the Municipal Class EA planning process (this Class EA Addendum).

Changes which modify the infrastructure within the County road right-of-way (minor design modifications) include: changes to the roundabout entry and exit geometry generally within the County's right-of-way; lane, median and

sidewalk widths again within the County's right-of-way; and signage and pedestrian, cycling and transit accommodation along the corridor which generally follows existing Provincial policy or guidelines which may not have been developed during the Class EA studies.

Localized operational improvements at the intersections with Cedar Street and Edgar Place could also be considered as minor infrastructure modifications. Cedar Street has no sidewalks and has a substandard width. Closure of Cedar Street at Rest Acres Road will reduce the potential for cut-through traffic attempting to bypass the traffic signals at King Edward Street and improve safety. The plan also includes changes to the limits of sidewalks, multi-use paths and the extent of the urban cross section. These will improve safety while having a limited impact on a local street connection to Rest Acres Road.

Other changes reflected in the plan which change access control to adjacent land or require additional property from adjacent land owners include: proposal for a new roundabout to service the lands north of Highway 403, south of Powerline Road and east of Rest Acres Road (this roundabout design affects the land owner on the west side of Rest Acres Road; and shift of the Vic Chambers Place roundabout southerly to a new location.

5.0 CONSULTATION PROGRAM

The following sections provide a summary of the consultation activities held during the study:

5.1 Notices

Notices of the Study were published as follows:

- Notice of Public Information Centre – Brantford Expositor and Paris Star: July 20 and July 27, 2017
- Notice of Filing of Study Completion – Brantford Expositor and Paris Star: February 12, 2018

See **Appendix C** for copies of the Notice of Study Commencement, the PIC reports, and the Notice of Filing of Study Completion.

5.2 Public Information Centre

A PIC was held for this study to document amendments to the abovementioned Class EAs. The purpose of the meeting was to present the overall corridor vision and preliminary design plan for Rest Acres Road between Highway 403 and King Edward Street.

The PIC was held on Wednesday, August 2, 2017 at the Brant Sports Complex, 944 Powerline Road, Paris, Ontario from 6:00 pm to 8:00 pm. Sixty-five (65) members of the public registered at the PIC. Sixteen (16) comment sheets were received at the PIC, and four (4) comment sheets were subsequently submitted during the two-week comment period following the PIC.

A series of display panels were presented that included descriptive text, photos and drawings around the meeting room for viewing. The public and agency representatives were encouraged to provide input/feedback.

County of Brant and consultant staff were available to respond to any verbal comments/questions.

5.3 Stakeholder Consultation

All agencies or groups that may have had an interest in the project or any documentation to contribute to the study were contacted at the start of the study for their input.

The ministries, agencies and utilities contacted included:

- Ministry of Natural Resources and Forestry
- Ministry of Tourism, Culture and Sport
- Ministry of Aboriginal Affairs
- Infrastructure Ontario
- Ministry of Municipal Affairs and Housing
- Ministry of Transportation
- Aboriginal Affairs and Northern Development Canada
- Ontario Federation of Agriculture
- Grand River Conservation Authority

- County of Brant Ambulance Services
- County of Brant Fire Department
- OPP Brant County
- Brant Haldimand Norfolk Catholic District School Board
- Conseil Scolaire de District Catholique Centre-Sud
- Grand Erie District School Board
- Brantford-Brant Chamber of Commerce
- Paris Downtown BIA
- Brantford Airport Commission
- CN Rail

The Indigenous Communities contacted included:

- Metis Nation of Ontario
- Mississaugas of the New Credit First Nation
- Six Nations of the Grand River
- Six Nations Economic Development Corporation
- Haudenosaunee Resource Centre

See **Appendix D** for Select Correspondence from these stakeholders.

6.0 CORRIDOR VISION

The vision for the Rest Acres Road corridor has evolved through a series of 3 separate Class EA studies that have established the design principles from which an integrated land use and transportation plan will be implemented. The Provincial and Municipal Class EA's have provided the MTO and County of Brant EA clearance to implement the projects and proceed to construction.

The vision for the road corridor is that it will transition the rural Highway 24 corridor to the south into a 4-lane divided arterial street beginning at the Highway 403 interchange and continuing northerly to King Edward Street through the Southwest Paris Urban Settlement Area. The street will utilize modern "Smart Streets" transportation planning principles of providing space within the road right-of-way for all road users (pedestrians, recreational cyclists, more confident cyclists, automobiles, trucks, transit vehicles and farm vehicles). The road design will achieve a more compact right-of-way by utilizing modern roundabout intersection control. This eliminates the conventional wider auto-centric street design that would include up to 7 lanes at major intersections (right turn, double lefts and 4 through lanes) by utilizing the efficiency of the roundabout to distribute time to all arriving vehicles and allowing the number of lanes to be reduced. The result is the space that is normally required for general purpose lanes can be used for space for pedestrians and cyclists.

The design is based on a future 4-lane urban arterial street, centre median to limit turning movements (improving safety) wide sidewalks for pedestrians and multi-use paths (MUP's) for recreational cyclists and pedestrians. Faster cyclists typically travelling at higher speeds can utilize the curb side lanes on Rest Acres Road (as permitted under the provincial Highway Traffic Act) to avoid slower speeds on the MUP's. The road corridor will be designed to accommodate a multiple range of users (mode choices) at different speeds of travel. The recent changes to Ontario's Highway Traffic Act now enhance safety and protection of pedestrians and cyclists at roundabouts by providing travel route choices and yielding of auto traffic to result in reduced delays and improved safety in comparison to previous traditional intersection designs. **Photo 1** illustrates an example of modern roundabout intersection control.

The advantages of the roundabout travel corridor and Class EA Addendum include:

- 1) Slower speeds of general traffic because the number of lanes is reduced (creating a narrower road corridor) and the use of roundabouts creates nodes at which vehicles must reduce speeds as they travel along the corridor.
- 2) Reduced sound levels along the corridor as travel speeds are reduced and the stop-and-go braking and acceleration are significantly reduced.
- 3) Improved safety by reducing the number of conflict points at each intersection (reduces the number of collisions and the severity of these collisions).
- 4) Reduced delays to pedestrians (no longer stop when crossing major intersections) and greater safety by providing separate and low speed sidewalks and MUP's for travel.
- 5) Reduced delays for vehicular traffic by eliminating stop conditions at all major intersections.
- 6) Reduced project cost: the shift of the cycling lanes to MUP's reduces the width of the road cross section and the use of roundabouts reduces the capital and future operating costs of the project.
- 7) The space within the road right-of-way now allows space for landscaping in boulevards and roundabouts.



Photo 1: Example of Roundabout (Hespeler Road, Cambridge, Ontario)

Another vision for the corridor is that surface stormwater will be collected along the outside curb lanes using a 2% crossfall on the pavement. The outer 600 mm of the road surface will be used for surface water flow and collection at curb-faced catchbasins. (This will create a wider curb side lane that can also accommodate cyclists choosing to travel on the roadway.) The stormwater management system will consider the use of Low Impact Development (LID) techniques to allow infiltration into the groundwater table and provide a supply of water for right-of-way landscaping in boulevards.

6.1 Project Phasing

The phasing of the corridor implementation will begin with the initial roundabout construction in 2018 at the Highway 403/Rest Acres/Highway 24 interchange. These initial roundabouts will include chicanes (median bulb-outs) to influence driver behavior by transitioning operating speeds from the higher speed entry approaches.

Subsequent sections of the arterial road will be improved to the north. The next project is planned to be the Powerline Road intersection.

7.0 CORRIDOR DESIGN STANDARDS

The corridor traffic control includes six individual roundabouts, which have been demonstrated by research to improve intersection safety by reducing vehicular, cyclist and pedestrian conflict points, encouraging reduced speeds and therefore reducing the severity of collisions.

The corridor will transition from a higher speed (80 km/h) rural arterial south of Bethel Road to a posted speed of 60 km/h north of Bethel Road. The corridor will reflect a vision of lower operating speeds and will have an urban cross section with a closed drainage system, curbs, raised median, illumination, boulevards, sidewalks, and MUP's. The roadway will incorporate the "Smart Streets" design philosophy by considering the separate modes of pedestrians, cyclists, cars, trucks and transit within the County's right-of-way.

The Smart Street philosophy will reflect the intensification of residential, commercial and recreational land uses both east and west of Rest Acres Road. The road will serve large volumes of auto trips that may have destinations to and from Highway 403 using a 4-lane cross section to provide a good level of service (reduced delays for all users). The use of modern roundabout designs will balance demand on all legs of each of the roundabouts and minimize delays for individual vehicles. The design standards proposed on the corridor are illustrated in **Table 2**.

Table 2: Proposed Rest Acres Road Design Standards

Geometric Element	Proposed Standards	Guideline/Description
Posted Speed	60 km/h	
Design Speed	70 km/h	
Design Vehicle	WB-20.5 Truck	Transport with 53 ft trailer
Median Lane Widths	3.5 m	
Curb (Right) Lane Widths	4.3 m	Accommodates curbside drainage and cyclists
Median Width	5.0	
Inner Boulevard	2.0 m minimum	Including a hard landscaped maintenance strip and soft landscaping with area for trees
Pavement Markings		OTM Book 11
Pedestrian Crossings	Level 2, Type B	OTM Book 15
Sidewalks	2.0 m	TAC Manual
Roundabout Inscribed Circle Diameter	55 m	National Cooperative Highway Research Program NCHRP Report 672
Multi-Use Pathway Width	3.0 m	
Utility Corridors	2.0 to 5.0 m	
Right-of-Way	+/- 37 m	Grading beyond right-of-way where required by topography and adjacent lot grading

7.1 Roundabouts

A roundabout is a subset of circular intersection control. The term "modern roundabout" is used in North America to differentiate roundabouts from the historical traffic circles, which are designed differently and operate under different yield rules. A roundabout operates under two principles:

- 1) Yield of Entry (adopted in the UK in 1966) - where all vehicles yield to vehicles on the circulatory roadway; and
- 2) Deflection of Entering Traffic, deflected to the right of the central island by tight channelization.

7.1.1 Key Features

The design of roundabouts involves maximizing both the operational performance and the safety of the design vehicle. This involves slow entry speeds, adequate lane capacity, balance and continuity, tight channelization and appropriate sight distances.

The key features of roundabout intersection control include:

- Counter-clockwise Circulation
- Centre Island
- Circulatory Roadway
- Centre Apron (to accommodate heavy vehicles)
- Splitter Islands (to induce lower operating speeds at the entries)
- Yield Lines (for crosswalks and entry to circulatory roadway)
- Accessible Pedestrian Crossings (vehicles yield to pedestrians)
- [Optional] Bypass Lanes (for high-volume right-turn movements)
- [Optional] Bicyclist Bypass Ramps (as an alternative to travelling on the circulatory roadway)

7.1.2 Safety Benefits

Roundabouts are recommended from a safety perspective as they have the following benefits:

- Slower traffic (low speed differentials with other road users);
- Increased safety for all road users;
- Improved traffic operation;
- Safe traffic flow in situations with unusual geometric conditions;
- Pedestrian and bicycle-friendly;
- Transition between two different settings ("gateway effect");
- Landmark opportunity; and
- Lower maintenance and operating costs.

A roundabout has fewer conflict points compared to a 4-leg intersection. As shown on **Figure 8**, a 4-leg roundabout has only 8 vehicle-to-vehicle conflict points whereas a conventional cross intersection can have up to 32 conflict points. This typically translates into a lower risk of collisions and requires a less complex traffic control (i.e. no need to separate conflicting movements with traffic signals).

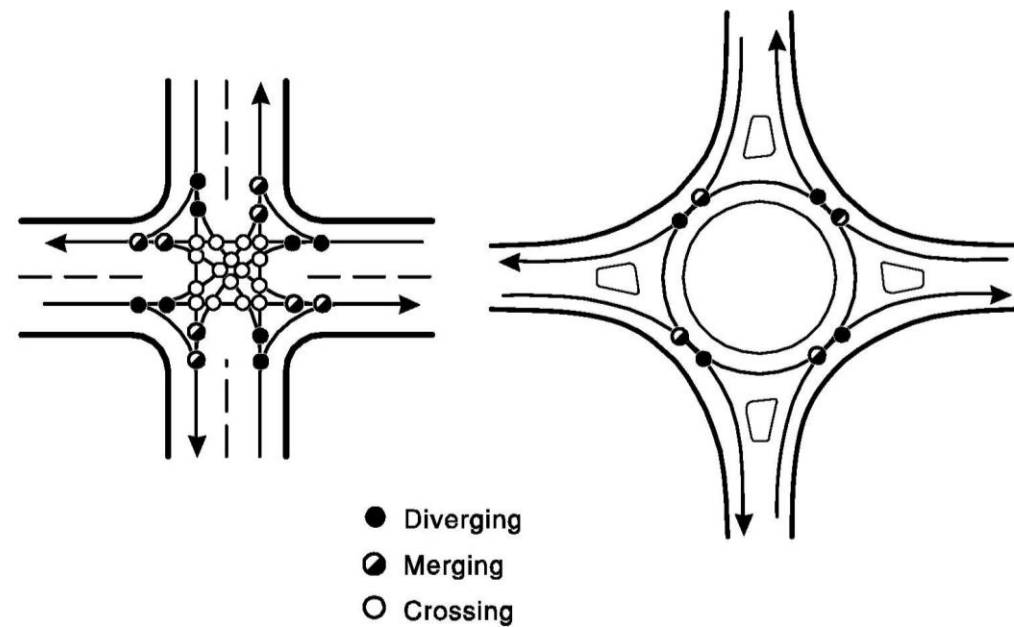


Figure 8: Vehicle Conflict Point Comparison (source: NCHRP 672 Roundabouts, an Informational Guide, TRB)

As stated in the NCHRP 672 Roundabouts, an Informational Guide:

“Separate turn lanes and traffic control (stop signs or signalization) can often reduce but not eliminate the number of crossing conflicts at a traditional intersection by separating conflicts in space and/or time. However, the most severe crashes at signalized intersections occur when there is a violation of such traffic control device designed to separate conflicts in time (e.g., a right-angle collision due to running a red light and vehicle-pedestrian collisions). Therefore, the ability of single-lane roundabouts to reduce conflicts through physical, geometric features has been demonstrated to be more effective than the reliance on driver obedience of traffic control devices.”

With regard to pedestrians, roundabouts have generally been proven to be safer than conventional intersections. As shown on **Figure 9**, a 4-leg roundabout has only 8 vehicle-to-pedestrian conflict points whereas a conventional cross intersection has up to 16 conflict points. Traffic signals can potentially reduce the risk of vehicle-pedestrian conflicts by allowing only a few movements at any time, but conflicts still exist with red light running (illegal), right turn on red (usually legal) and left/right turn on green (legal).

Bicycle-related conflicts can be associated to vehicle-to-vehicle or vehicle-to-pedestrian conflicts depending on whether the cyclist remains in the shared traffic lane through the intersection or uses the adjacent pathway and crossings.

In a roundabout, it has been determined that the risk of collision is increased when the cyclist circulates on the right side of the roadway because their visibility is reduced as they are exposed to conflict with entering and exiting drivers. To avoid this issue, cyclists are recommended to either position themselves to the middle of the travelled lane as they circulate through the roundabout, or to use pathways and crossings around the roundabout.

A roundabout operating within capacity will generally produce lower delays than a conventional intersection operating with the same traffic volumes. Also, according to AASHTO’s 2010 Highway Safety Manual, the conversion of

an urban unsignalized intersection into a roundabout leads to an 81% reduction of collisions with death or injury, and a 29% reduction in all collisions. According to the same source, the conversion of a signalized intersection to a roundabout leads to 78% reduction of collisions with death or injury and a 48% reduction in all collisions. Injury and death collisions are reduced more dramatically than damage-only collisions because of the configuration of roundabouts which eliminates right-angle, left-turn and head-on collisions.

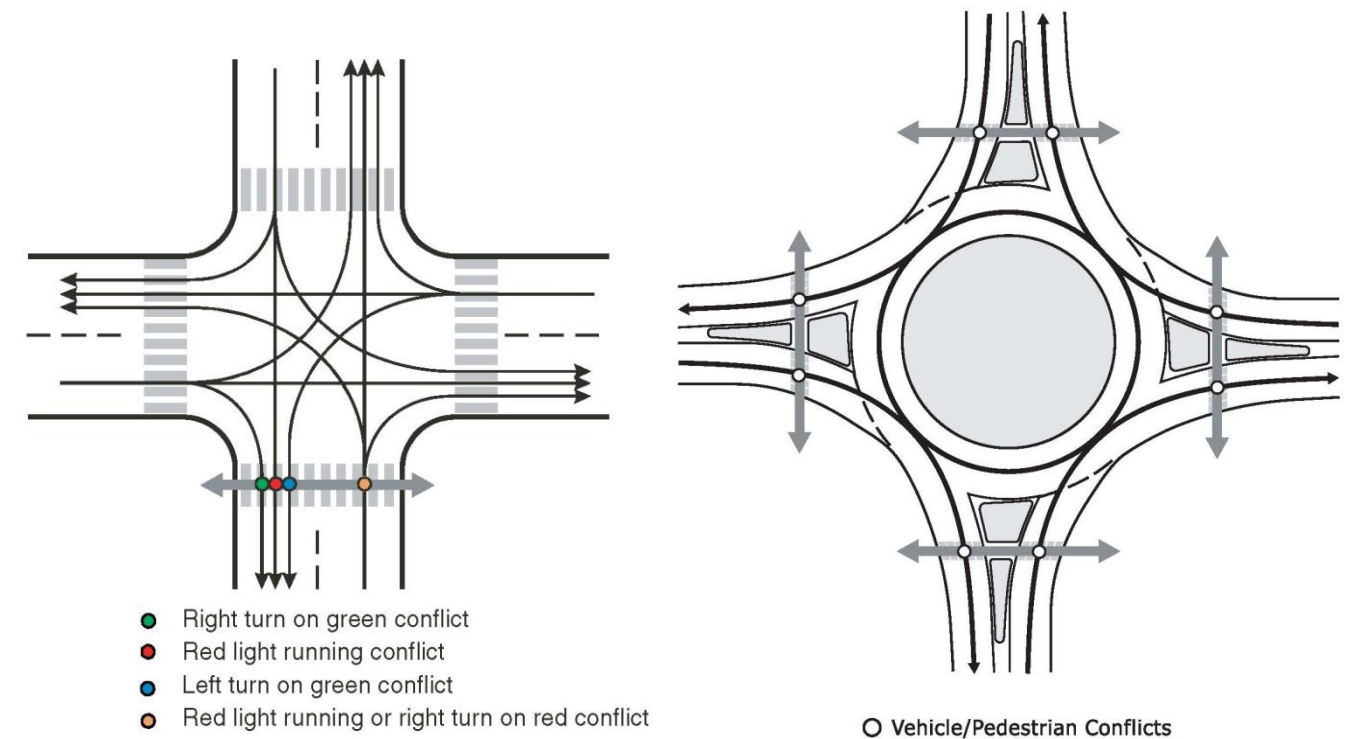


Figure 9: Pedestrian Conflict Point Comparison (source: NCHRP 672 Roundabouts, an Informational Guide, TRB)

7.2 Design Vehicles

A governing factor when designing a roundabout is the consideration of what type of vehicle will be operating within the area. When considering the design vehicle, the roundabout must be able to accommodate the largest possible vehicle that is likely to use the intersection (i.e. trucks). On this corridor, roundabouts have been designed for WB-20.5 trucks (trucks with 53 ft trailers), consistent with the MTO design standards of the Highway 403 interchange. All roundabouts on Rest Acres Road will feature a 4.5 m truck apron around the central island and a 55 m inscribed circle diameter, which will be within the typical range as per the NCHRP guidelines.

7.3 Pedestrians

Pedestrian movements will be accommodated in the corridor with dedicated sidewalks (2.0 m width to accommodate wheelchairs) or MUP’s (3.0 m width to accommodate pedestrians, cyclists, wheelchairs, roller-skaters and skateboarders). Provision will be made to extend sidewalks southerly through the Highway 403 interchange in the future.

See **Figure 10** for the illustrative signage and line markings for pedestrians. Installation of Level 2 Type B pedestrian crossovers will be staged as needed.

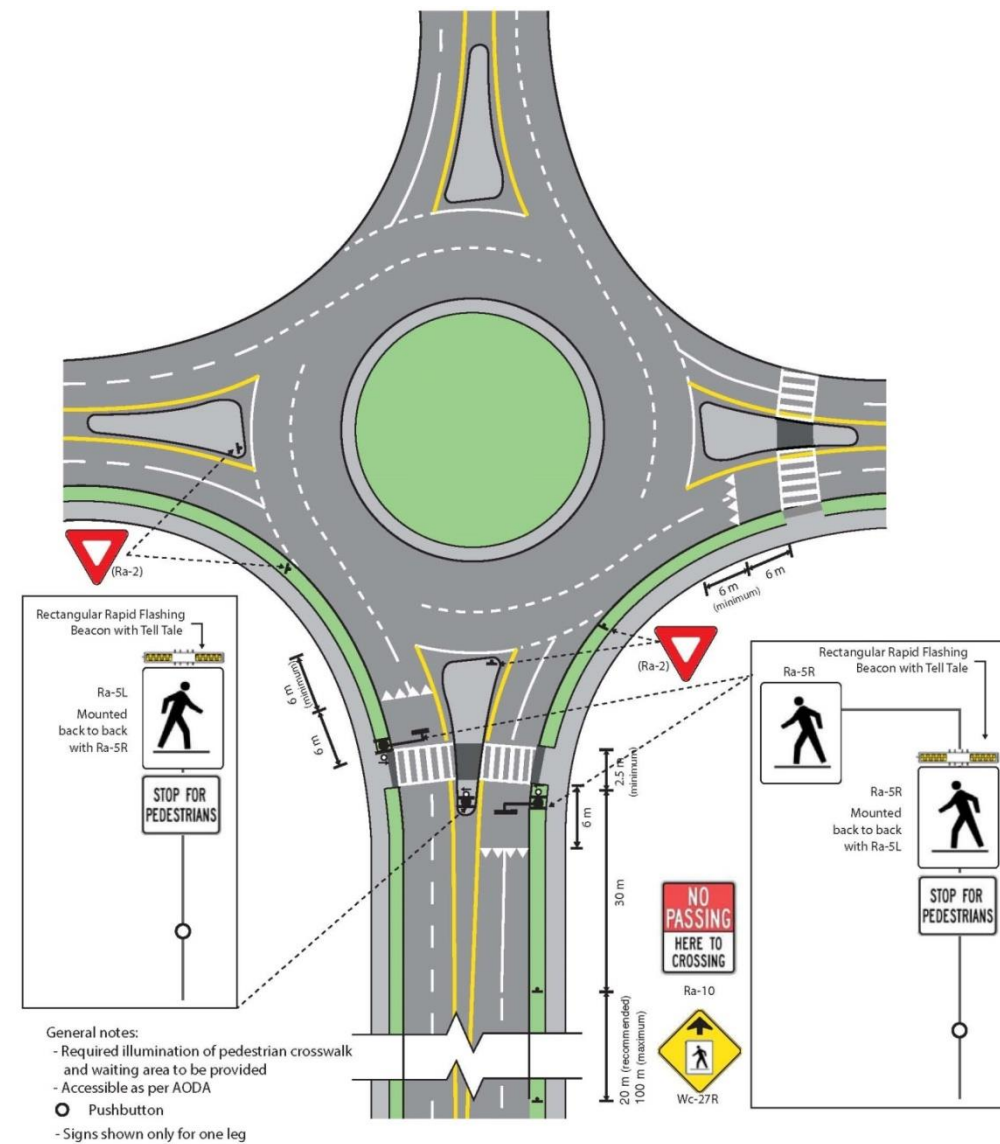


Figure 10: Pedestrian Crossover Level 2 Type B – Double-Lane Roundabout (Source: OTM Book 15)

7.4 Cyclists

Bicyclists will be accommodated by:

- Shared cycle/vehicular and lane (for more experienced cyclists). The drainage system is recommended to include curb inlet catchbasins to remove the hazard to cyclists.
- In-boulevard MUP's on both the east of west sides of the right-of-way to accommodate recreational cyclists.

At the multi-lane roundabouts, cyclists using the curb lane will be given a choice between sharing the roadway in the roundabout with motorists and transitioning to an in-boulevard MUP by using a ramp. The bicyclist bypass ramp and MUP would be similar to the illustration in **Figure 11** which shows the transition to a bicycle lane.

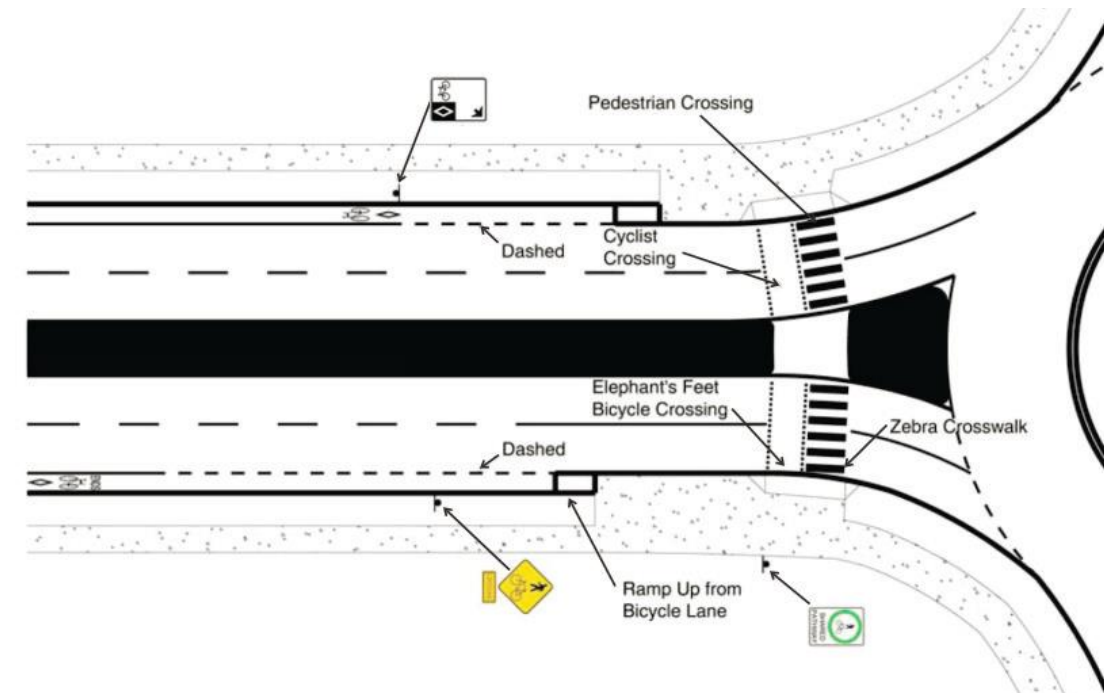


Figure 11: Bicycle Lane at a Multi-lane Roundabout with Bicycle Bypass (Source: OTM Book 18)

7.5 Public Transit

The provision of roundabouts benefit public transit services in terms of running times and reliability by reducing traffic delays and traffic queuing at intersections. This translates into reduced costs and a better level of service, because roundabouts allow for smooth traffic flows (as opposed to queuing at red lights). A research report prepared for the U.S. Department of Transportation documented the operational benefits of roundabouts on the reliability of transit service.

The default configuration of bus stops should be curb-side (i.e. on the right-hand traffic lane) since they allow for bus drivers to depart without having to merge into traffic. Their benefits over bus bays under normal conditions are as follow:

- Transit operation improvements in terms of running time, reliability, scheduling and cost;
- Reduction of the overall person-delay when considering all road users compared to bus bays;
- Minimal impact on motorists (though perception may be different);
- No evidence of safety issue compared to bus bays;
- Lower construction and maintenance costs; and
- Better urban environment (less pavement, more pedestrian-friendly).

Bus stops can be positioned at 3 different locations:

- **Near-side stops** are located at the entry, upstream of the crosswalk. They provide the benefit of having a low-speed environment since drivers are slowing down in anticipation of the roundabout. However, they may prevent drivers from seeing pedestrians on the crosswalks. For that reason, a distance of at least 15 m upstream of the crosswalk is recommended.
- **Far-side stops** are located at the exit, downstream of the crosswalk. They allow full view of the crosswalk to drivers and keep bus users from blocking the bus departure as they cross the street. Queuing may occur behind the bus, which may affect traffic in the roundabout, although exiting traffic may be able to use the other lane to pass the bus. A bus bay could be used to avoid this situation, but bus drivers may have some difficulty seeing vehicles approaching from behind as they attempt to merge into the traffic lane.
- **Midblock stops** are located approximately halfway between two intersections. They are less likely to cause queuing or sightline issues. However, they are in a higher-speed environment and they create a pedestrian crossing demand. A pedestrian crossover would typically be provided at each midblock bus stop which would impact the flow of traffic.

The use of far-side transit stops on Rest Acres Road is recommended, as shown on **Photo 2** and **Photo 3**, to maximize the visibility of the pedestrian crosswalks for motorists exiting the roundabouts. The frequency of required transit stops will be dependent on the development growth along the corridor. Considering the proximity of intersections on Rest Acres Road, the need for midblock transit stops is not anticipated.

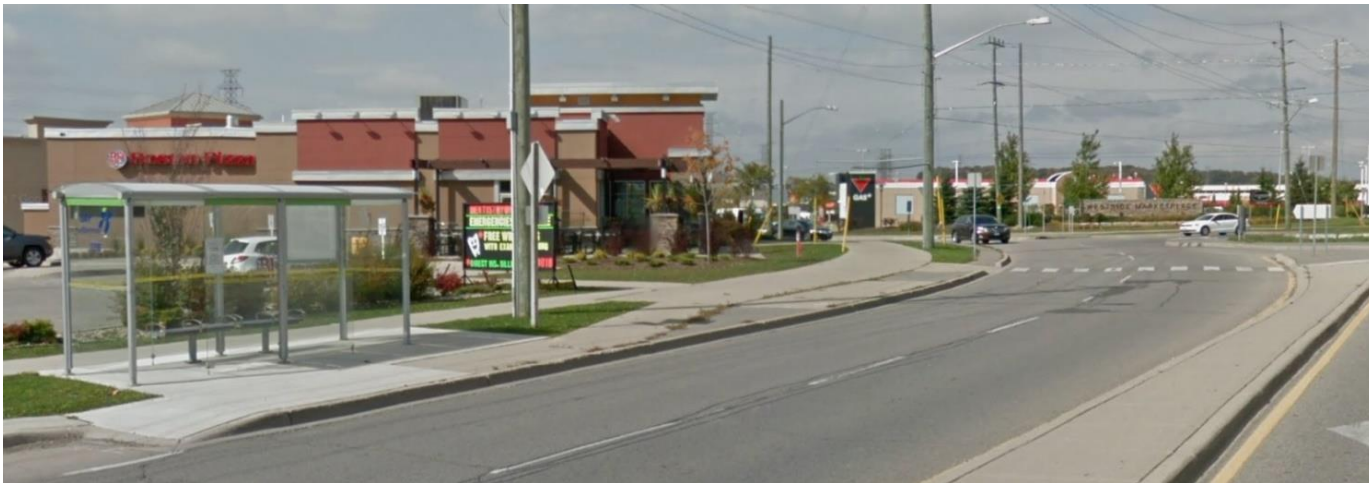


Photo 2: Bus Shelter near Roundabout on Ira Needles Boulevard in Waterloo, Ontario



Photo 3: Bus Shelter near Roundabout on Ira Needles Boulevard in Waterloo, Ontario

7.6 Signage

Signage along the corridor will follow Ontario guidelines including the Ontario Traffic Manual (OTM) Book 15 (Pedestrian Crossings) and OTM Book 18 (Cycling Facilities). The lane marking will include advance signage and in-lane arrows to delineate drivers to be in the median lane when entering the roundabouts to position vehicles to make a left turn on to a side street. The operation of large trucks is accommodated by trucks straddling each lane on the approach to the roundabout and using both lanes and/or the apron to wheel track through the roundabout. **Figure 12** illustrates typical signage and line markings. North of Highway 403 it is anticipated that the separate destination signage typically used by MTO on provincial highways would either not be provided or would be combined with the Advance Road ID signage.

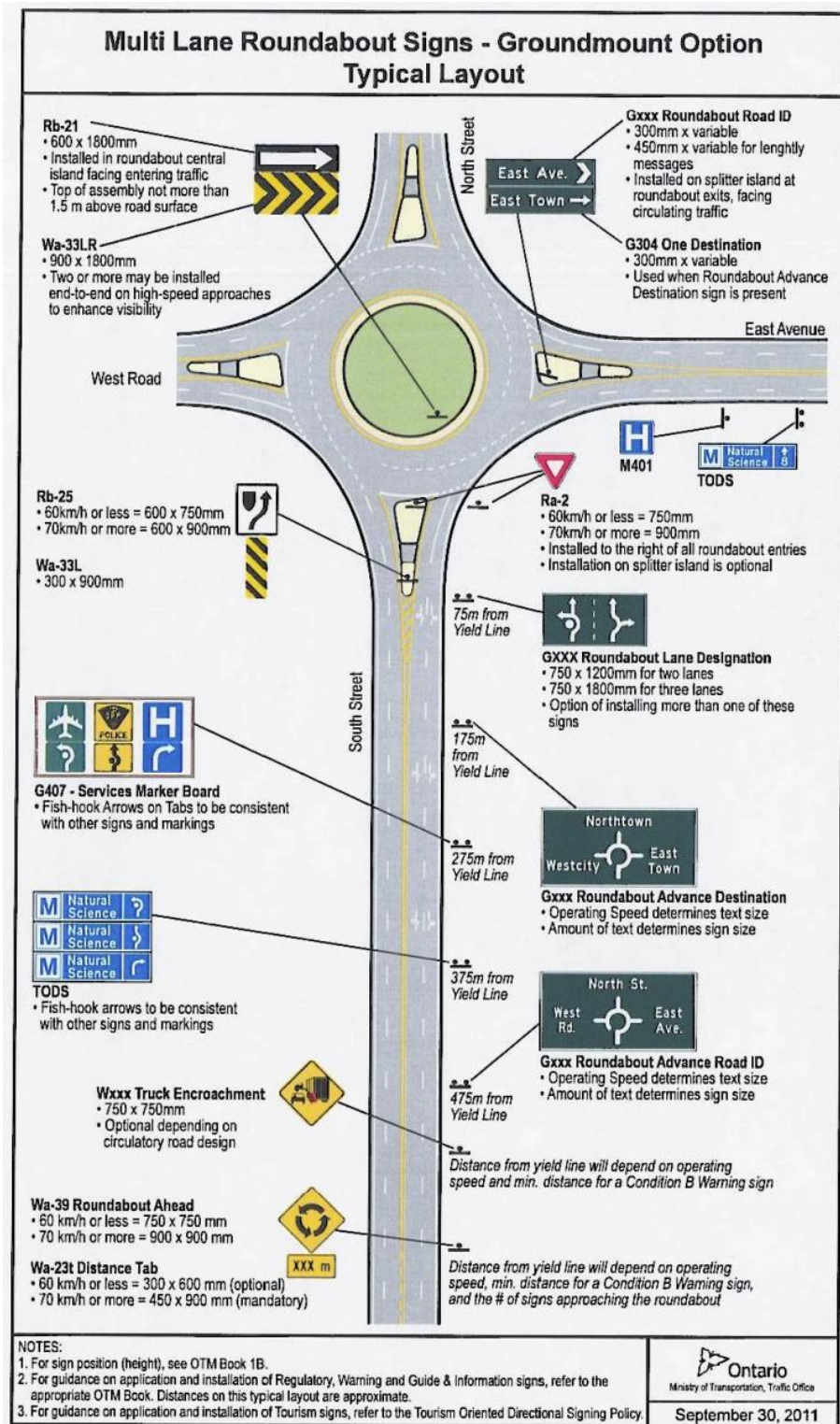


Figure 12: Typical Signage on a Multilane Roundabout (Source: MTO)

8.0 TRAFFIC ANALYSIS

A traffic analysis was performed using the microsimulation tool Vissim 10. The afternoon peak hour was examined as a worst case scenario as traffic during that period is generally busier than during the morning peak hour. The results are presented in terms of average delay per vehicle and level of service.

8.1 Traffic Volumes

The turning movement volumes used for the purpose of this analysis are based on the following sources:

- Class EA for Rest Acres Road, IBI, January 2012
- Mile Hill Subdivision Traffic Report, F.R. Berry & Associates, March 2015
- Brant 403 Business Park Long-Term Traffic Impact Study, IBI, June 2015
- Gurney Lands Access Assessment, BTE, January 2017
- Traffic Count Report, County of Brant, July 2017

The available traffic data was applied to the intersections within the study area as indicated in **Table 3**. The Brant 403 Business Park traffic impact study (2015 TIS) is more recent than the Class EA for Rest Acres Road and was completed by updating the traffic data from the 2012 Class EA and adding the traffic generated by the business park. For these reasons, the 2015 TIS is used as the main reference and its 2036 traffic volume projection was used – specifically the scenario involving the construction of a new interchange on Bishopsgate Road.

Table 3: Sources of the Traffic Volume Projections

Intersection	Date
King Edward Street	<i>Class EA 2012</i> Brant 403 Business Park 2015
Laurie Ann Lane / Hanlon Place	Class EA 2012 (side streets only)
Cobblestone Drive	Class EA 2012 (side streets only)
1084 Rest Acres Road	Traffic Count Report 2017 (site traffic)
Arlington Parkway / Court Drive	Class EA 2012 (side streets only)
Vic Chambers Place	Class EA 2012 (west side only)
Edgar Place	Mile Hill Subdivision 2015 (east side only)
Powerline Road	<i>Class EA 2012</i> Mile Hill Subdivision 2015 (east side only) Brant 403 Business Park 2015
Pit Haul Road	Gurney Lands Assessment 2017
Highway 403 (both ramp terminals)	<i>Class EA 2012</i> Brant 403 Business Park 2015

Italics = data available, not used **Bold** = data used for analysis

Traffic volume projections at the intersections between Powerline Road and King Edward are not included in the 2015 TIS and had to be obtained from the 2012 Class EA and the 2015 Mile Hill Subdivision study. These volumes were then adjusted to reflect a common (2036) horizon year while eliminating volume imbalances between Powerline Road and King Edward Street from the various available projections. No data were originally available at the access to/from 1084 Rest Acres Road; the County conducted a traffic count on July 5, 2017 to obtain this data.

8.2 Intersection Configuration

The future Rest Acres Road corridor between Highway 403 and King Edward Street will include 7 roundabouts, 1 signalized intersection, 1 full unsignalized intersection and several right-in/right-out accesses.

Access management and intersection spacing are important elements of roadway planning for the safe and efficient movement of traffic. Traffic engineering standards typically identify the desirable spacing between major access points to be at least 250-400 m and the minimum spacing to be 250 m. The proposed intersection of Rest Acres Road and Edgar Place, proposed as a roundabout in the 2012 Rest Acres Road Class EA, is located approximately 225 m north of Powerline Road and fails to meet this minimum standard.

Following the recommendation for a roundabout at Vic Chambers Place, which was presented at the PIC in 2017, a meeting was held with the property owner. It was agreed at the meeting that the roundabout at Vic Chambers Place would be replaced with a right-in/right-out intersection and that the roundabout initially proposed at Edgar Place would be relocated to Lydia Lane, approximately 90 m to the north, to better integrate with the land use plans proposed by the developers. The modified location is reflected in the Recommended Plan in **Section 12.0: Plates**. The notes of the meeting can be found in **Appendix D**.

An analysis of area traffic operations confirmed that, with the provision of roundabouts along the corridor, suitable roadway capacity will continue to exist with the right-in/right-out operation. In addition, left turn demands could be accommodated by right turn movements with motorists circumnavigating the adjacent roundabouts with minimal out-of-way-travel.

The existing intersection of Rest Acres Road and Cedar Street, located on the inside of a horizontal curve, is recognized to have restricted sight distance. The planned road widening will further reduce visibility at the intersection and as area traffic volumes continue to grow the volume of cut-through traffic using Cedar Street to avoid the intersection with King Edward Street will potentially increase. Cedar Street's restricted right-of-way width is unable to accommodate provisions for pedestrians or reconstruction to an appropriate standard for any increase in traffic volumes. Closure of Cedar Street has therefore been recommended as a localized safety improvement.

As roundabouts are proposed at Cobblestone Drive and at Arlington Parkway, the existing entrance that is shared by the commercial tenants at 1084 Rest Acres Road (Tim Hortons and commercial plaza) is recommended to be converted to a right-in/right-out access since left turn demands can be accommodated by circumnavigating the adjacent roundabouts with minimal out-of-way-travel.

The future configuration at each intersection on Rest Acres Road is presented in **Table 4**.

Table 4: Future Intersection Configuration

Location	Control	Lane Configuration by Approach			
		Eastbound	Southbound	Northbound	Westbound
King Edward Street	Signals		—		
Laurie Ann Lane / Hanlon Place	EB-WB Stop				
Cobblestone Drive	Roundabout				
1084 Rest Acres Road	Right-in / Right-out				—
Arlington Parkway / Court Drive	Roundabout				
Vic Chambers Place	Right-in / Right-out	—			
Lydia Lane	Roundabout				
Powerline Road	Roundabout				
Pit Haul Road	Roundabout	—			
Highway 403 W ramps	Roundabout	—			
Highway 403 E ramps	Roundabout				—

8.3 2036 Traffic Operations

The ultimate horizon year for the Brant 403 Business Park Traffic Impact Study is 2036. The same horizon year is used for the purpose of this analysis. The results of the traffic analysis are presented in **Table 5**. Detailed turning movement volumes and traffic analysis results are available in **Appendix A**.

Table 5: Traffic Analysis Results – 2036 Projection, PM Peak Hour

Intersections	Control	Simulated Volume	Average Delay (s)	LOS
King Edward Street	Signalized	1931	11	B
Laurie Ann Lane / Hanlon Place	Stop EB WB	34 40	10 9	A A
Cobblestone Drive	Roundabout	1186	1	A
Arlington Parkway / Court Drive	Roundabout	1520	1	A
Lydia Lane	Roundabout	2012	3	A
Powerline Road	Roundabout	2001	2	A
Pit Haul Road	Roundabout	2244	3	A
Highway 403 West ramps	Roundabout	3118	2	A
Highway 403 East ramps	Roundabout	3622	1	A

The results indicate that all intersections would operate very well during the afternoon peak hour. Therefore, the proposed configuration for the future Rest Acres Road is considered satisfactory in terms of traffic operation.

8.4 Pedestrian Crossings

Pedestrian crossings will most suitably be located at controlled intersections as shown on the preliminary plan. As development plans along the corridor become more formalized, the potential pedestrian routes/demands will become more evident and consideration could be given to additional controlled pedestrian crossings if required.

9.0 LANDSCAPING

Landscaping in the corridor is proposed to utilize low maintenance materials and salt resistant plantings to reduce maintenance. **Photo 4** illustrates a typical treatment for the corridor which will include:

- Stamped, coloured concrete as maintenance strips for centre medians;
- Select landscaped medians;
- Stamped, coloured concrete or asphalt maintenance strips along the outside curb lines; and
- Low level landscaping within the islands in the roundabout (to permit visibility of vehicles moving within the roundabout).

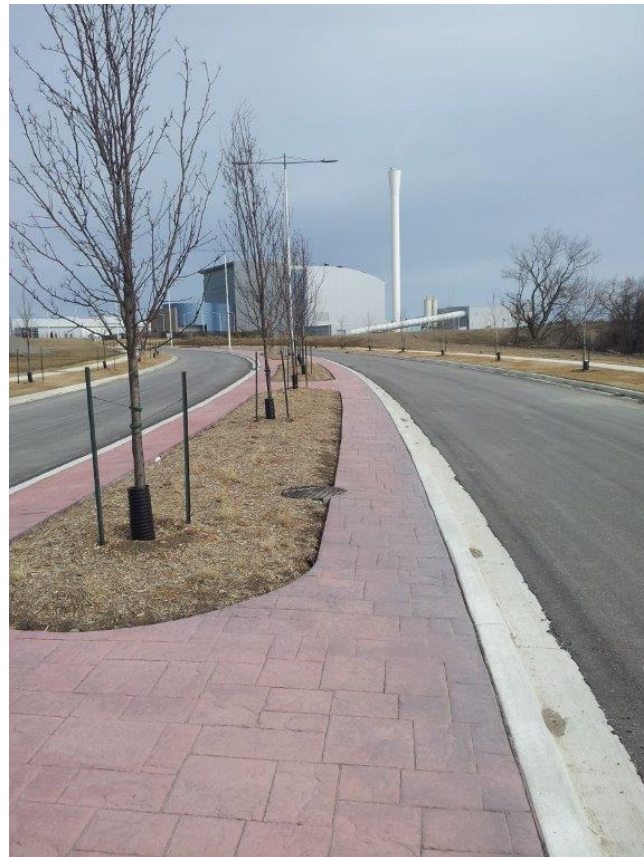


Photo 4: Sample Corridor Landscaping

Within the roundabouts, outside the MTO control, the County has the opportunity to create gateway features. For these unique areas it will be possible to provide irrigated areas that will support significant elements. See **Photo 5** of an example gateway.



Photo 5: Example of Gateway Feature

9.1 Illumination

Street lighting will be located within the centre median providing illumination of travelled lanes. Municipal services are proposed to be located within travelled lanes to protect the median from pole bases (and the root balls of plantings). Illumination will include LED cut-off lighting to reduce light spill over into adjacent residential developments.

Illumination design is proposed to consider:

- Low level decorative poles along multi-use pathways; and
- A higher level pole in the centre of the roundabout to increase lighting levels to improve nighttime visibility of vehicles tracking the circulatory roadway.

The lighting layout will comply with ANSI/IESNA RP-8-14 guidelines for illuminance and luminance values and uniformity ratio. In addition to roadway lighting, RP-8-14 also outlines the required lighting parameters for pedestrian walkways, cycle paths and intersections.

County of Brant, Development and Engineering Standards will also apply to the lighting layout and infrastructure, including lighting pole and installation standards, spacing and wiring requirements.

9.2 Centre Apron

The centre island design is proposed to include:

- Mountable curb;
- Concrete apron surface; and
- Alternating panels of rumble strip and flat surfaces (to discourage non truck travel over centre apron).

9.3 Urban Form

The adjacent commercial and residential development can have relatively close offsets to the right-of-way. **Photo 6**, **Photo 7** and **Photo 8** illustrate compact urban development examples. The residential example is based on a street side front façade of the residential units and driveway access from the rear yard, eliminating driveways and noise barriers on the arterial street.



Photo 6: Residential Development



Photo 7: Commercial Development at Ira Needles Boulevard and Erb Street, Waterloo, Ontario



Photo 8: Muskegon Michigan

Noise abatement should be considered for all residential development with noise studies submitted to the County for approval. Noise barriers can be used if the developments propose rear lots along the corridor and, in this case, the right-of way can allow landscaping of these barriers as illustrated in **Photo 9**.



Photo 9: Barriers with Landscaping

10.0 MITIGATION PLAN

Effects on the environment were considered in accordance with the Municipal Class EA process.

The remaining areas of concern, related to the Recommended Plan, will be mitigated to minimize or remove any detrimental effects. **Table 6** provides a description of areas of concern and responses to issues that were identified with the Recommended Plan. No other effects requiring mitigation were identified in this study.

Table 6: Summary of Potential Environmental Effects and Proposed Mitigations

I.D #	Factors	Agency/ Authority	Issue & Potential Effects	Proposed Mitigation Measure
1.1 Natural Environments				
1.1	Species at Risk	MNRF	<ul style="list-style-type: none"> Potential disruption to terrestrial habitat and SAR (including identified Barn Swallow, Eastern Meadowlark, Bobolink and Eastern Wood Pewee as well as potential Whip-poor-will). 	<ul style="list-style-type: none"> Prepare appropriate mitigation plan in detailed design phase for protection of existing watercourses and natural habitat. Ensure contractor's staff are trained to recognize potentially affected species and are required to notify authorities if any are encountered on site.
1.2	Erosion and Sediment	MOECC	<ul style="list-style-type: none"> Potential for erosion / sedimentation during construction. 	<ul style="list-style-type: none"> Incorporate standard erosion and sediment control measures into the construction contract, including measures to prevent off-site transport of sediment and prompt restoration of disturbed areas.
1.3	Groundwater Source Protection	MOECC	<ul style="list-style-type: none"> No wellhead protection areas or municipal wells were identified in the area. Potential impacts to private drinking water wells if extensive dewatering is necessary. 	<ul style="list-style-type: none"> Assess impacts to groundwater if dewatering is necessary.
2.0 Cultural Environments				
2.1	Archaeology	MTCS	<ul style="list-style-type: none"> Stage 1 Archaeological Assessment has identified areas of archaeological potential. 	<ul style="list-style-type: none"> If deeply buried archaeological remains are encountered during construction, the contractor must notify the Ministry of Tourism, Culture and Sport. A Stage 2 Archaeological Assessment will be completed during detail design.
2.2	Heritage	MTCS	<ul style="list-style-type: none"> No impacts were identified to Heritage buildings or property in the area. 	

I.D #	Factors	Agency/ Authority	Issue & Potential Effects	Proposed Mitigation Measure
3.0 Socio-Economic Environments				
3.1	Property Impacts – Permanent	Property Owner	<ul style="list-style-type: none"> Property impacts (i.e. access to 1084 Rest Acres Road development) as a result of roundabout access control. 	<ul style="list-style-type: none"> See discussion below.
3.3	Noise Quality	MTO, MOECC, Brant County	<ul style="list-style-type: none"> Noise nuisance from construction equipment and vehicles during construction. Sound level changes as a result of construction 	<ul style="list-style-type: none"> Contractor will be required to abide by noise control bylaws for day-to-day operations. Noise analysis determined no meaningful change in sound levels that would require mitigation.
4.0 Transportation Environment				
4.1	Utilities	Utilities	<ul style="list-style-type: none"> Potential for impacts to existing utilities as a result of construction of Rest Acres Road. 	<ul style="list-style-type: none"> Ensure advance coordination with utility companies and approval for any utility relocations / protection.

10.1 1084 Rest Acres Road Commercial Development

A collaborative discussion between Vicano Developments (the owner of 1084 Rest Acres Road), the County and consultant led to the following proposal that was accepted by the County and Vicano Developments as a favourable stepped approach to implementing longer term roadway improvements.

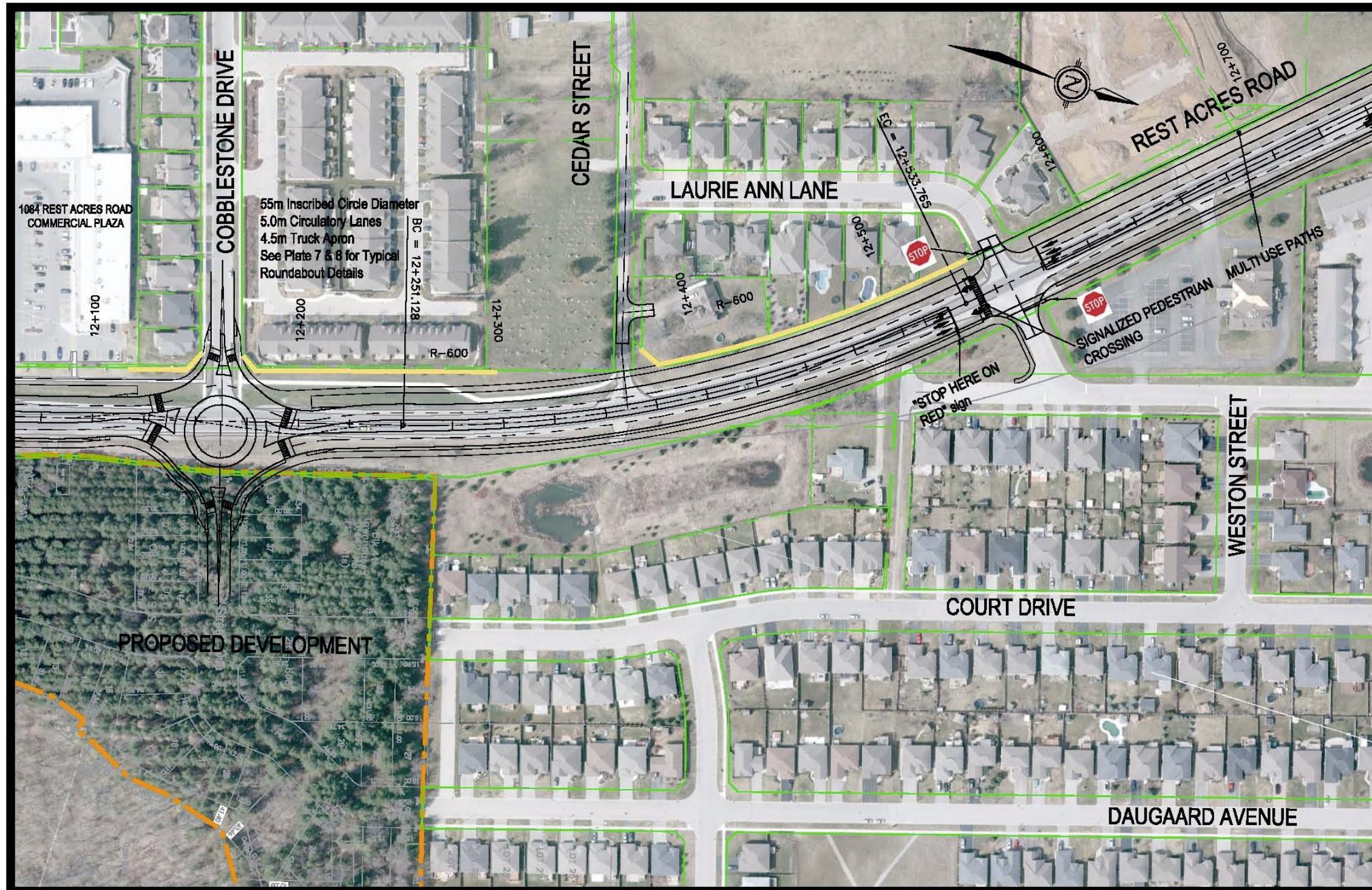
Long Term Plan: The Class EA Addendum would include the consideration for an offset roundabout at Cobblestone Drive. This avoids the residential properties, improves the access to the 1084 site and would have land requirements to the east. Meetings will be scheduled with these land owners. The 1084 site access would be converted to a right-in and right-out driveway and be bookended with roundabouts to the north and south and include a joint internal access between commercial lots. The County would provide temporary signage for a 3 month period following closure of the left turn access.

Interim Plan: An interim plan would be accepted that would allow northbound left turns into the site from Rest Acres. Exiting traffic would be restricted to right only (southbound) directed to the roundabout.

The timeline for the interim period would be for 5 to 10 years based on triggers.

10.2 Noise Mitigation

Noise impacts will be mitigated for existing residential properties from Cobblestone Drive northerly on the west side of Rest Acres Road. In these areas a new 3.0 m acoustical noise barrier will be included as a visual and acoustical barrier to shield rear yards from noise along Rest Acres Road. The barrier will be located on lands owned by the County of Brant. The barrier location plan is illustrated on **Figure 13**. The Noise Assessment report can be found in **Appendix E**.



Legend:

 PROPOSED NOISE BARRIER

Figure 13: Proposed Noise Barrier Location on Rest Acres Road

11.0 FUTURE ACTIVITIES

Following EA clearance and a 30 day public review period with no objections, this project, or any individual element of this project, may proceed to detail design and construction by the County after obtaining the necessary environmental permits and approvals and subject to availability of funding and construction priorities. Mitigation measures listed in **Section 10.0** are to be incorporated during detailed design and construction, as appropriate.

12.0 PLATES