
Appendix C: Evaluation of Alternatives



HIGHWAY 138 IMPROVEMENTS

FROM HIGHWAY 401 TO HIGHWAY 417

GWP 4015-08-00

November 2016

**Eastern Region
Planning & Design Section
Ministry of Transportation Ontario**

Evaluation of Alternatives Report

Table of Contents

1.0	EVALUATION OF ALTERNATIVES	1
1.1	Methodology	1
1.2	Evaluation Criteria	1
1.2.1	Screening Evaluation of Carpool Lot Alternatives	5
1.2.2	Screening Evaluation of Passing Lane Alternatives	6
1.2.3	Qualitative Assessment	6
1.2.4	Quantitative Assessment	6
1.3	Evaluation of Intersection Alternatives	7
1.3.1	Brookdale Avenue	7
1.3.2	Cornwall Centre Road	9
1.3.3	Headline Road	10
1.3.4	Dundas Street (County Road 18)	12
1.3.5	Valade Road / Island Road	14
1.3.6	Wheeler Road	16
1.3.7	Myers Road / McPhail Road	17
1.4	Evaluation of Passing Lane Alternatives	19
1.4.1	Advantages and Disadvantages	19
1.4.2	Preferred Alternative	19
1.5	Evaluation of Carpool Lot Alternatives	21
1.5.1	Preferred Alternatives	21

TABLES

Table 1:	Evaluation Criteria	2
Table 2:	Screening Evaluation of Carpool Lot Alternatives	5
Table 3:	Screening Evaluation of Passing Lanes	6
Table 4:	Brookdale Avenue – Alternative Advantages and Disadvantages	7
Table 5:	Cornwall Centre Road – Alternative Advantages and Disadvantages	9
Table 6:	Headline Road – Alternative Advantages and Disadvantages	10
Table 7:	Dundas Street (County Road 18) – Alternative Advantages and Disadvantages	12
Table 8:	Valade Road / Island Road – Alternative Advantages and Disadvantages	14
Table 9:	Wheeler Road – Alternative Advantages and Disadvantages	16
Table 10:	Myers Road / McPhail Road – Alternative Advantages and Disadvantages	17
Table 11:	Passing Lane – Alternative Advantages and Disadvantages	19
Table 12:	Carpool Lots – Alternative Advantages and Disadvantages	21

EXHIBITS

Exhibit 1:	Evaluation Criteria Weight	5
------------	----------------------------	---

APPENDIX

Appendix A	Evaluation Scoring and Evaluation Data
Appendix B	Alternatives

This page intentionally left blank.

1.0 Evaluation of Alternatives

1.1 METHODOLOGY

This report provides an overview of the evaluation process that was completed to assist with identifying and confirming a recommended plan.

The evaluation process identifies an improvement plan that is cost-effective, provides safe operations, and is compatible with local planning and transportation objectives, while minimizing impacts to the environment. This is completed by identifying evaluation criteria, and evaluating each alternative based on the relative importance of the criteria. The process generally follows four steps, which are further outlined below:

- Identify and confirm evaluation criteria
- Screening evaluation of passing lane and carpool lot alternatives
- Evaluate alternatives
- Confirm preferred plan

1.2 EVALUATION CRITERIA

In accordance with the Class EA for Provincial Transportation Facilities (2000), MTO projects are required to consider a wide range of potential impacts to the natural, social, cultural and applied environments in the study area. Evaluation criteria were identified in advance of Public Information Centre (PIC) 1 and were established based on existing conditions and background data, provincial guidelines, project experience, and public and agency input. Following PIC 1, both the criteria, and factors considered within each criterion were reviewed and updated to reflect comments received and updated study area conditions.

The evaluation criteria are independent variables, each of which may contribute a positive or negative influence on the overall suitability of an alternative. Although it is important to explicitly consider the suitability of an alternative in terms of each criterion, it is also useful to establish an overall composite score by determining appropriate weighting (relative importance) among the criteria. Each evaluation criterion is assigned a weight that represents its relative importance to the other criteria.

The following table identifies the evaluation criteria for this study, including the factors considered for each criterion, and the methodology and measurement for each of the factors. Since this study includes several different components (i.e., intersections, passing lanes, and carpool parking lots), some factors were identified that did not apply to all of the components. Generally, the specific factors for each criterion have been developed for each component of this study (i.e., intersections, passing lanes, carpool parking lots).

Table 1: Evaluation Criteria

Highway Engineering

Criteria	The Best Improvement Plan...	Factors Considered	Applies to	Methodology/Measure
Traffic Operations	... provides acceptable Level of Service (LOS) on Highway 138 and at intersections	Traffic delay	Intersections	Delay values have been calculated based on alternative design using future projected (2039) volumes. For signalized intersections the overall intersection traffic delay (seconds/vehicle) is calculated by taking a volume weighted average of all the total delays. The average intersection delay for unsignalized intersections is based on an average of each movement's delays.
		Traffic queue length	Intersections	The average queue lengths were calculated for each alternative design using future projected (2039) volumes.
		Assured Passing Opportunity	Passing Lanes	Is the Required Assured Passing Opportunity > the Available Assured Passing Opportunity?
		Level of Service	Passing Lanes	A measure of the level of service improvement with the passing lane Source: <i>Highway 138 Corridor Traffic Operations and Safety Review, IBI Group, January 2014</i>
		Total Travel Time Savings	Passing Lanes	A measure of the total travel time (vehicle hours) in percentage with the passing lane Source: <i>Highway 138 Corridor Traffic Operations and Safety Review, IBI Group, January 2014</i>
		Percent Time Spent Following	Passing Lanes	A measure of the time spent following another vehicle in percent with a passing lane Source: <i>Highway 138 Corridor Traffic Operations and Safety Review, IBI Group, January 2014</i>
Site Location		Proximity to Existing Parking	Carpool Lots	Is the location near to existing known parking areas?
		Access to an Interchange	Carpool Lots	Is the location near to an interchange?
Geometrics & Safety	...meets the design standards for provincial highways and intersections ...minimizes potential for collisions on Highway 138 and at intersections	Geometrics and Safety	All components	Do horizontal and vertical alignments meet standards? Are warrants satisfied? Has pedestrian safety been considered? Source: <i>Geometric Design Standards for Ontario Highways</i>
		Impacts to driveways	Intersections	A measure of the number of driveways requiring reconstruction.
		Safety Benefit	Passing Lanes	A measure of the expected collision reduction in absolute collision savings Source: <i>Highway 138 Corridor Traffic Operations and Safety Review, IBI Group, January 2014</i>
Site Characteristics		Site Topography	Carpool Lots	Suitability of site to construct a carpool lot; flat preferred.
		Site Access	Carpool Lots	Does site provide good opportunity for access considering: adjacent intersections, turning lanes & railway.
		Proximity to Utility Services	Carpool Lots	Are existing utility services readily available?
Constructability	...can be constructed using conventional construction techniques ...can be constructed with minimal impacts to traffic	Construction feasibility	All components	Construction techniques (conventional or non-conventional), and constraints.
		Traffic impacts during construction	All components	Number of lane shifts, number of traffic detours, number of closures.
Total Cost	...has the lowest total cost including utility relocations and property acquisition	Construction costs	All components	Cost estimate based on material quantities (2016 unit prices).
		Utility relocations costs	All components	Cost estimate based on a measure of utility impacts.
		Property acquisition costs	All components	Cost estimate based on area of property impacted.

Social & Cultural Environment

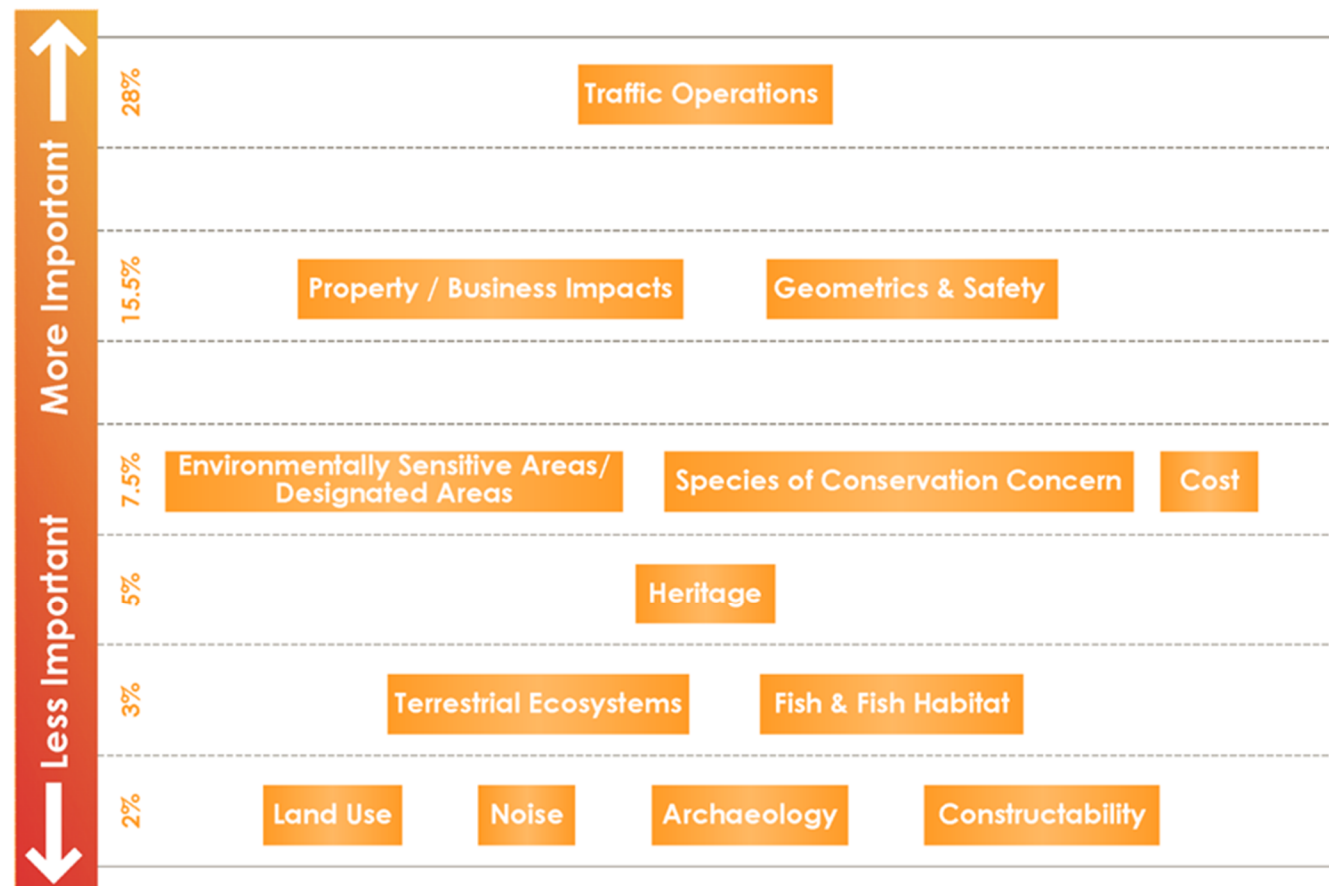
Criteria	The Best Improvement Plan...	Factors Considered	Applies to	Methodology/Measure
Property & Business	...has the least impact to private property	Number and area of private property impacts	All components	Count of the number and area of private property impacted. Source: <i>Ontario Parcel Data as provided by MTO</i>
		Impact to area identified for future development	All components	Identify property required in hectares based on lands identified for future development. Source: <i>City of Cornwall and SDG Official Plans; and submitted applications to MTO Corridor Control</i>
		Access to businesses	All components	Number of entrance and access modifications to existing businesses.
		Business acquisitions	All components	Number of business acquisitions.
Noise	...minimizes noise impacts at Noise Sensitive Receivers (NSR's)	Potential for noise increase at Noise Sensitive Receivers (NSRs)	All components	Number of NSRs (residential properties) within 600 metres that have the potential to experience an increase in noise.
Land Use	...minimizes impacts to sensitive land uses ... is compatible with existing and future development plans	Accommodates existing snowmobile crossings	All components	Identify requirement to realign or relocate existing Trans Ontario Provincial Snowmobile Trail crossing. (Yes / No) Source: <i>OFSC Trail Maps</i>
		Impact to active farmland	All components	Identify area of agricultural land required in hectares. Source: <i>Site conditions and the SDG Agricultural Land Layer (SDG)</i>
		Impact to aggregate and mineral reserves	All components	Identify impact to current or identified quarries/pits in hectares, including modifications to access and direct property requirements based on site conditions, SDG Mineral and Aggregate Reserve lands and MNR Pits and Quarries maps.
		Impact to potentially contaminated property	All components	Identify property required from potentially contaminated properties in hectares. Source: <i>COS (Genivar, 2011), Stantec limited COS review (2016)</i>
Built & Cultural Heritage	...does not impact existing cultural and built heritage features along the Highway 138 corridor	Impact to registered built heritage / cultural feature	All components	Number and scale of impact to designated built and cultural heritage features. Source: <i>Built Heritage Resources and Cultural Heritage Landscapes (Genivar, 2010)</i>
		Impact to stone wall at Pioneer Cemetery (Dundas Street only)	Dundas Street / CR 18 Alternatives	Identify impact to the stone wall at Pioneer Cemetery. (Yes / No)
Archaeology	...has the least impact on archaeological resources	Impact to registered archaeological sites	All components	Identify area of impact to registered archaeological sites in hectares. Source: <i>Stage 1 Archaeological Assessment (Genivar, 2010)</i>

Natural Environment

Criteria	The Best Improvement Plan...	Factors Considered	Applies to	Methodology/Measure
Terrestrial Ecosystem	...has the least impact on wildlife habitat (i.e., deer yards) ...has the least impact on significant trees or vegetation	Unevaluated wetlands	All components	Identify area of unevaluated wetland impacted (m ²). <i>Source: Terrestrial Existing Conditions Report (Stantec, 2016) and SDG and Cornwall Official Plans</i>
		Impact to significant trees	All components	Number of large or significant trees impacted. <i>Source: Site review, Terrestrial Existing Conditions Report (Stantec, 2016), Existing Conditions Report (Genivar, 2011)</i>
		Area of vegetation removal	All components	Identify area of natural vegetation that will be removed in m ² . <i>Terrestrial Existing Conditions Report (Stantec, 2016), Existing Conditions Report (Genivar, 2011)</i>
Fish & Fish Habitat	...minimizes impacts to creeks and water bodies ...minimizes impacts to fish and fish habitat	Number of new culverts or culvert extensions over fish bearing watercourses	All components	Number of new culverts or culvert extensions required at fish bearing watercourses and length of realignments in metres. <i>Fish and Fish Habitat Existing Conditions Report (Stantec, 2016)</i>
		Area of impact to fish habitat	All components	Identify area of impact to identified fish habitat in m ² . <i>Fish and Fish Habitat Existing Conditions Report (Stantec, 2016)</i>
Species of Conservation Concern	...does not impact Species-at-Risk or habitat associated with Species-at-Risk	Impact to rare species	All components	Identify impact to identified rare species and Species-at-Risk. (Yes / No) <i>Terrestrial Existing Conditions Report (Stantec, 2016), Existing Conditions Report (Genivar, 2011)</i>
		Impact to potential rare species habitat	All components	Identify area of impact to potential rare or Species-at-Risk habitat in m ² . <i>Source: Terrestrial Existing Conditions Report (Stantec, 2016), Existing Conditions Report (Genivar, 2011)</i>
Environmentally Sensitive Areas, Designated Areas	...does not impact the Newington Bog Provincially Significant Wetland (PSW) / Area of Natural and Scientific Interest (ANSI) ...does not impact Sourcewater Protection Areas	Impact to Newington Bog (Passing Lanes only)	Passing Lanes	Identify area of the Newington Bog Provincially Significant Wetland in m ² . <i>Source: PSW Layer (SDG) and MNRF Natural Heritage Mapping</i>
		Impact to Sourcewater Protection Areas	All components	Identify area of impact to designated Sourcewater Protection Areas in m ² . <i>Source: Raisin Region Conservation Authority Sourcewater Protection Maps (2016)</i>

The judgments on the relative importance of the evaluation criteria were based on a pairwise comparison of each criterion to each other criterion to assess which criterion is more important and by how much. Determining the importance of each criterion was based on engineering judgment, environmental significance, input received from external agencies, and input received from the public. The results of this process are depicted in Exhibit 1.

Exhibit 1: Evaluation Criteria Weight



1.2.1 Screening Evaluation of Carpool Lot Alternatives

For the carpool lot alternatives, a screening process has been developed to confirm technically feasible alternatives, or combinations of alternatives, to carry forward to a detailed evaluation.

The screening of the conceptual alternatives uses two criteria:

1. Does the alternative realistically address the existing problem and opportunity?
2. Does the alternative, when used in combination with other alternatives, make a significant contribution towards realistically addressing the problem and opportunity?

Only those carpool lot alternatives, or combinations of alternatives that satisfy at least one of the above criteria were carried forward to the detailed evaluation.

Table 2 provides a summary of the screening evaluation of carpool lot alternatives. Generally, the need for a carpool lot has been identified based on existing conditions and comments received from the public and local businesses.

Table 2: Screening Evaluation of Carpool Lot Alternatives

Conceptual Alternative	Addresses Problem / Opportunity?	Carry Forward to Evaluation?
Do Nothing	<ul style="list-style-type: none"> Does not address concerns identified by the public and businesses regarding carpool and commuter parking on private property 	No
Carpool parking in the vicinity of Highway 401	<ul style="list-style-type: none"> The public has identified a need for carpool parking in the vicinity of Highway 401 through comments submitted to MTO and a petition There is a commuter bus stop in this location 	Yes
Carpool parking mid-block between Highway 401 and Highway 417	<ul style="list-style-type: none"> The public has identified a need for carpool parking along Highway 138 through comments submitted to MTO Local businesses have identified concerns with commuter parking in commercial parking lots There are four private commuter bus stops located between Highway 401 and Highway 417 (St. Andrew's West, Bonville, Monkland, and Moose Creek with daily ridership of approximately 20) 	Yes
Carpool parking in the vicinity of Highway 417	<ul style="list-style-type: none"> Based on public feedback, the carpool survey, and site observations, there does not appear to be a need for carpool parking in the vicinity of Highway 417 There are no adjacent communities that would benefit directly from a carpool parking lot at this location There are additional carpool parking lots at nearby interchanges along Highway 417 that are currently being considered for expansion The need for a carpool parking lot in this location could be reconsidered in the future 	Not within the current planning horizon

Two carpool lots are recommended: one in the vicinity of Highway 401 and one mid-block between Highway 401 and Highway 417. The mid-block location is recommended based on observations, the carpool lot survey, and public and agency comments. A mid-block location will satisfy the identified parking need in the northern part of the study area.

The results of the screening evaluation indicate that carpool lots should be considered in the vicinity of Highway 401 and mid-block between Highway 401 and Highway 417. The following alternatives were considered for the carpool lots:

- 1 – North side of Cornwall Centre Road just east of Brookdale Avenue
- 2 – East side of Highway 138, approximately 1.0 km north of Dundas Street (St. Andrews)
- 3 – East side of Highway 138, approximately 200 m north of County Road 43 (Monkland)

Two carpool lots were developed for consideration in the vicinity of Highway 417 to confirm if there are any current significant impacts with the locations. Since these locations did not meet the screening requirements, they will not be

carried forward as part of this study. An environmental assessment study would be required to move forward with either of the following sites:

- 4 (a) – East side of Highway 138, on the south side of Highway 417
- 4 (b) – West side of Highway 138, on the north side of Highway 417

1.2.2 Screening Evaluation of Passing Lane Alternatives

For the passing lane alternatives, a screening process has been developed to confirm technically feasible alternatives, or combinations of alternatives, to carry forward to a detailed evaluation.

The screening of the conceptual alternatives uses two screening criteria:

1. Does the alternative realistically address the existing problem and opportunity?
2. Does the alternative, when used in combination with other alternatives, make a significant contribution towards realistically addressing the problem and opportunity?

Only those passing lane alternatives or combinations of alternatives that satisfy at least one of the above criteria were carried forward to the detailed evaluation. Table 3 provides a summary of the screening evaluation of passing lane alternatives. Generally, the need for passing lanes is identified based on a combination of traffic volumes, highway operations, and driving conditions (e.g. aggressive driving, frequent overtaking).

Table 3: Screening Evaluation of Passing Lanes

Conceptual Alternative	Addresses Problem / Opportunity?	Carry Forward to Evaluation?
Do Nothing	<ul style="list-style-type: none"> • Does not address the lack of passing opportunities in the study area 	No
One set of Passing Lanes (one northbound and one southbound)	<ul style="list-style-type: none"> • Previous traffic studies have identified a need for future passing lanes between Headline Road and Highway 417 • Has the potential to improve safety by providing passing opportunities that reduce the risk of conflicts with opposing or turning traffic • Has the potential to improve highway capacity 	Yes
Two sets of passing lanes (two northbound and two southbound)	<ul style="list-style-type: none"> • Previous traffic studies have identified a need for future passing lanes between Headline Road and Highway 417 • Has the potential to improve safety by providing passing opportunities that reduce the risk of conflicts with opposing or turning traffic • Has the potential to improve highway capacity • Current traffic volume projections do not warrant two set of passing lanes 	No

A Corridor Traffic Operations and Safety Review (2014) identified preliminary locations for northbound and southbound passing lane alternatives based on travel time savings and reduction in time spent following a slower vehicle. These locations were reviewed, based on the results of the screening evaluation and study area conditions.

A second set of passing lanes could be viable in the future if there are changes to traffic volumes or operations in the study area. Based on current traffic volumes, the need for a second set of passing lanes is outside of this current planning horizon. A separate environmental assessment study would be required to identify the need for and complete environmental requirements at that time.

The following four passing lane alternatives were carried forward based on an ideal length (1.5 – 2 km), avoiding municipal road intersections, minimizing impacts to entrances and private property, and minimizing impacts to natural, social and cultural features:

- NB-1 Headline Road to County Road 43 – between Myers Road and Guindon Road (2 km long)
- SB-1 Headline Road to County Road 43 – between Red Schoolhouse Road and County Road 43 (1.7 km long)
- NB-2 County Road 43 to Highway 417 – between Gravel Hill Road and Warina Road (2 km long)
- SB-2 County Road 43 to Highway 417 – between County Road 15 and Sandringham Road (2 km long)

Based on the screening evaluation, one preferred northbound and one preferred southbound passing lane will be carried forward following the detailed evaluation.

1.2.3 Qualitative Assessment

A qualitative assessment of the alternatives was completed by tabulating the advantages and disadvantages of each alternative based upon the evaluation criteria developed and the scale of potential impacts for each criterion. Advantages and disadvantages are identified by plus sign (+) and minus sign (-), respectively. Otherwise, a bullet sign (●) identifies a neutral comment where there is no clear advantage or disadvantage.

1.2.4 Quantitative Assessment

A quantitative assessment that provides a score based on the weights of each evaluation criterion and number of advantages and disadvantages for each alternative was completed – a total score has been established for each intersection study area, passing lane, and carpool lot by adding the score for each factor together to determine a total weighted score for each alternative.

Once the number of positive, negative, and neutral counts is tabulated, each alternative was scored based on the sum of positive, neutral and negative counts multiplied by the criteria weights to determine a weighted score for each alternative.

The formula to determine the weighted score for each evaluation criteria is:

$$\left[\frac{\text{Positive Count} + \frac{1}{2} \text{Neutral Count}}{\text{Positive Count} + \text{Neutral Count} + \text{Negative Count}} \right] \times \text{Criteria Weight}$$

1.3 EVALUATION OF INTERSECTION ALTERNATIVES

The following section provides the results of the qualitative and quantitative assessment of the alternatives, including a summary of the advantages and disadvantages of each alternative. The advantages and disadvantages were identified following a detailed assessment of the evaluation criteria and factors for each alternative. Data sheets and the scoring worksheets for each alternative are provided in Appendix A. The score for each alternative is provided at the end of the advantages and disadvantages table. Plans showing the alternatives are provided in Appendix B.

1.3.1 Brookdale Avenue

The following alternatives were considered at Brookdale Avenue:

- “Do Nothing”
- A1 Northbound right-turn channelization
- A2 Realign intersection

A summary of the advantages and disadvantages of each alternative is provided in Table 4.

1.3.1.1 Preferred Alternative

A right-turn channelization is warranted based on the current traffic volumes at Brookdale Avenue. The addition of a right-turn channelization will improve traffic flow on Highway 138 with minimal impacts to the natural, social, and cultural environment.

The preferred alternative for Brookdale Avenue is Alternative A1: Northbound right-turn channelization. Alternative A1 was selected as the preferred alternative at Brookdale Avenue because it:

- Improves traffic flow by providing northbound right-turn channelization
- Satisfies the MTO’s right-turn channelization warrant
- Accommodates a possible future Highway 138 By-Pass

Table 4: Brookdale Avenue – Alternative Advantages and Disadvantages

Category	Criteria	Alternative		
		Do Nothing	A1	A2
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> - Has the longest overall average intersection delay - Has the longest vehicle queue lengths 	+ Improves the northbound traffic operations compared to Do Nothing	+ Improves the northbound traffic operations compared to Do Nothing + Has the shortest overall average intersection delay + Has the shortest vehicle queue lengths
	Geometrics & Safety	<ul style="list-style-type: none"> + Horizontal alignment meets design standard + Accommodates future Highway 138 By-Pass - Does not satisfy MTO warrant for channelized northbound right-turn lane • No operational or safety issues identified • No measurable pedestrian safety differences between alternatives • No impacts to driveways 	<ul style="list-style-type: none"> + Horizontal alignment meets design standard + Satisfies MTO warrant for channelized northbound right-turn lane + Accommodates future Highway 138 By-Pass • No measurable pedestrian safety differences between alternatives • No impacts to driveways 	<ul style="list-style-type: none"> + Vertical alignment meets design standard - Horizontal alignment does not satisfy minimum design standard - T-intersection on horizontal curve is not desirable - Does not accommodate future by-pass • No measurable pedestrian safety differences between alternatives • No impacts to driveways
	Constructability	+ No construction required	• Minimal impact to traffic during construction	- Significant impact to traffic during construction
	Total Cost	+ No cost	• Approximate total cost of \$150,000	- Approximate total cost of \$340,000
Social & Cultural Environment	Business & Property	<ul style="list-style-type: none"> + No impacts to properties • No impact on future development lands 	<ul style="list-style-type: none"> - Minor impacts to Cornwall Mazda property • No impact on future development lands 	<ul style="list-style-type: none"> - Minor impacts to Cornwall Mazda property • Has the potential to improve access to future development in the southwest quadrant

Category	Criteria	Alternative		
		Do Nothing	A1	A2
Natural Environment	Terrestrial Ecosystem	+ No impacts to vegetation	• Approximately 100 m ² of vegetation impacted	• Approximately 200 m ² of vegetation impacted
	Fish & Fish Habitat	+ There are no new culverts or culvert extensions required + There are no fish-bearing watercourses impacted	- 2 new crossings of a watercourse that provides seasonal fish habitat - Impacts approximately 230 m ² of an Unnamed Tributary	- 2 new crossings of a watercourse that provides seasonal fish habitat - Impacts approximately 305 m ² of an Unnamed Tributary
Overall Score		49	63	49

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Built and Cultural Heritage, Archaeology, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.3.2 Cornwall Centre Road

The following alternatives were considered for Cornwall Centre Road:

- “Do Nothing”
- B1 Improved corner radius
- B2 Channelized right-turn lane

A summary of the advantages and disadvantages of each alternative is provided in Table 5.

1.3.2.1 Preferred Alternative

The operation of the southbound right-turn has been identified as a local concern at the Highway 138 / Cornwall Centre Road intersection. This movement is challenging for trucks and vehicles with a wide turning radius, can slow

following vehicles, and can create operational issues for eastbound left-turning vehicles if a truck must enter into their lane to make its turn. There is also a perception that improvements to this turn could support making this section of Highway 138 a more desirable route for trucks.

The preferred alternative for Cornwall Centre Road is Alternative B1: improved corner radius. Alternative B1 was selected as the preferred alternative at Cornwall Centre Road because it:

- Accommodates southbound right-turning trucks, which minimizes potential for traffic delays
- Requires less property than Alternative B2
- May provide a more desirable route for trucks, which has the potential to reduce the number of southbound right-turns at Dundas Street / CR 18

Table 5: Cornwall Centre Road – Alternative Advantages and Disadvantages

Category	Criteria	Alternative		
		Do Nothing	B1	B2
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • No measurable difference between alternatives – Potential traffic delays if southbound trucks cannot make right-turn 	<ul style="list-style-type: none"> • No measurable difference between alternatives + Accommodates southbound right-turning trucks, which minimizes potential for traffic delays 	<ul style="list-style-type: none"> • No measurable difference between alternatives + Accommodates southbound right-turning trucks, which minimizes potential for traffic delays
	Geometrics & Safety	<ul style="list-style-type: none"> – Large trucks have difficulty with southbound right-turn • No impact to driveways 	<ul style="list-style-type: none"> + Improves southbound right-turn radius + Improves eastbound left-turn lane storage + May provide a more desirable route for trucks – Longer walk distance for pedestrians crossing north leg – Minor impact to 1 driveway approach 	<ul style="list-style-type: none"> + Improves southbound right-turn radius + Improves eastbound left-turn lane storage + May provide a more desirable route for trucks • Channelized island provides refuge for pedestrians crossing on north leg – Pedestrians must cross channelized right-turn without traffic control – Minor impact to 1 driveway approach
	Constructability	<ul style="list-style-type: none"> • No construction required 	<ul style="list-style-type: none"> – Moderate impact to traffic during construction 	<ul style="list-style-type: none"> – Moderate impact to traffic during
	Total Cost	<ul style="list-style-type: none"> + No cost 	<ul style="list-style-type: none"> • Approximate total cost of \$86,000 	<ul style="list-style-type: none"> – Approximate total cost of \$117,000
Social & Cultural Environment	Business & Property	<ul style="list-style-type: none"> • No impacts to properties 	<ul style="list-style-type: none"> – Minor impacts to Stephen Fitzgerald Motors property 	<ul style="list-style-type: none"> – Minor impacts to Stephen Fitzgerald Motors property
Overall Score		43	50	46

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Built and Cultural Heritage, Archaeology, Terrestrial Ecosystems, Fish and Fish Habitat, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.3.3 Headline Road

The following alternatives were considered for Headline Road:

- “Do Nothing”
- C1 Signalized intersection with left-turn lanes
- C2 Roundabout

A summary of the advantages and disadvantages of each alternative is provided in Table 6.

1.3.3.1 Preferred Alternative

Traffic control (i.e., traffic signals or a roundabout) is warranted at the Highway 138 / Headline Road intersection, based on current traffic volumes and the existing operations of the intersection. Traffic control at this location will improve traffic operations and has the potential to minimize collisions.

The preferred alternative for Headline Road is Alternative C2: Roundabout. Alternative C2 was selected as the preferred alternative at Headline Road because it:

- Provides the most improved traffic operations, including the shortest delay in travel time and vehicle queue lengths
- Has the potential to decrease the number and severity of collisions
- Provides traffic calming with reduced speeds
- Has the potential to act as a gateway feature in a key transition area

Although there is a perception that roundabouts can be difficult for trucks to navigate, the roundabout will be designed to accommodate all vehicles. Roundabouts are becoming a more common traffic control measure on provincial highways.

Table 6: Headline Road – Alternative Advantages and Disadvantages

Category	Criteria	Alternative		
		Do Nothing	C1	C2
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> – Has the longest overall average intersection delay – Has the longest vehicle queue lengths 	<ul style="list-style-type: none"> • Improves the overall average intersection delay compared to “Do Nothing” • Vehicle queue lengths will be shorter than “Do Nothing” 	<ul style="list-style-type: none"> + Has the shortest overall average intersection delay + Approach delays will be shortest + Vehicle queue lengths will be shortest
	Geometrics & Safety	<ul style="list-style-type: none"> – Does not satisfy MTO commitment to provide signals or a roundabout – Does not provide warranted northbound & southbound left-turn lanes – Does not adequately accommodate pedestrians & cyclists – Highest expected collision frequency – Potential for severity of collisions remains unchanged + No impact to driveways 	<ul style="list-style-type: none"> + Satisfies MTO commitment to provide signals or a roundabout + Northbound & southbound left-turn lanes satisfy warrants + Controls movement of pedestrians & cyclists compared to “Do Nothing” • Lower expected collision frequency compared to “Do Nothing” • Potential to decrease the severity of collisions • Minor impact to 1 driveway approach 	<ul style="list-style-type: none"> + Satisfies MTO commitment to provide signals or a roundabout + Does not require northbound & southbound left-turn lanes, while still accommodating these movements + Controls movement of pedestrians & cyclists compared to “Do Nothing” + Lowest expected collision frequency + Greatest potential to decrease the severity of collisions + Serves as a “Gateway” in a key transition area + Provides traffic calming with reduced speeds – Minor impacts to 3 driveway approaches • Perceived to be difficult for large trucks to negotiate – Significant impacts to traffic during construction
	Constructability	<ul style="list-style-type: none"> + No construction required 	<ul style="list-style-type: none"> • Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> – Significant impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> + No cost 	<ul style="list-style-type: none"> • Approximate total cost of \$1.15 M 	<ul style="list-style-type: none"> – Approximate total cost of \$1.85 M

Category	Criteria	Alternative		
		Do Nothing	C1	C2
Social & Cultural Environment	Business & Property	+ No impacts to properties	• Minimal impacts to 1 residential property	– Minimal impacts to 3 residential properties
	Terrestrial Ecosystem	<ul style="list-style-type: none"> • No impacts to unevaluated wetlands • No impacts to vegetation 	<ul style="list-style-type: none"> • No impacts to unevaluated wetlands – Approximately 320 m² of vegetation impacted 	<ul style="list-style-type: none"> – Approximately 100 m² of unevaluated wetland impacted – Approximately 820 m² of vegetation impacted
Overall Score		43	53	55

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Built and Cultural Heritage, Archaeology, Fish and Fish Habitat, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.3.4 Dundas Street (County Road 18)

The following alternatives were considered at Dundas Street (County Road 18):

- “Do Nothing”
- D1 Major realignment of Dundas Street
- D2 Minor realignment of Dundas Street and minor shift of Highway 138 to the east
- D3 Major realignment of Dundas Street and minor shift of Highway 138 to the east

A summary of the advantages and disadvantages of each alternative is provided in Table 7.

1.3.4.1 Preferred Alternative

The overall traffic operations at the Highway 138 / Dundas Street / CR 18 intersection are acceptable. However, the intersection geometrics, including the southbound right-turn radius, are not desirable, and have resulted in impacts to the historically designated Pioneer Cemetery stone wall. Although a range of intersection improvement alternatives were developed and evaluated, the property adjacent to the intersection is significantly constrained by designated heritage properties, which limit the scope of intersection improvements that can be considered. None of the alternatives that were developed and evaluated provide an overall improvement to the operation of the intersection.

The preferred alternative for Dundas Street / CR 18 is Do Nothing. This plan was selected as the preferred alternative at Dundas Street because it:

- Maintains acceptable overall traffic operations
- Avoids impacts to private property
- Does not impact built and cultural heritage features
- Avoids impacts to potential unmarked graves outside of the cemetery boundary

Minor improvements, including new curb and sidewalks, are being provided as part of the preferred plan to provide additional delineation between vehicles and pedestrians.

It is recommended that additional minor improvements be considered to minimize impacts to the stone wall at the Pioneer Cemetery. Further discussions with St. Andrews West Parish, St. Andrews Historical Society, and Ministry of Tourism, Culture, and Sport, will be required to confirm the range of minor improvements that can be considered. Any additional improvements (including confirming improvements to minimize impacts to the stone wall), will require additional discussions outside of the scope of the current study.

Table 7: Dundas Street (County Road 18) – Alternative Advantages and Disadvantages

Category	Criteria	Alternative			
		Do Nothing	D1	D2	D3
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • Acceptable intersection operations + Has the shortest average intersection delay 	<ul style="list-style-type: none"> • Acceptable intersection operations - Has the longest average intersection delay with the removal of eastbound right-turn channelization 	<ul style="list-style-type: none"> • Acceptable intersection operations + Has the shortest average intersection delay with the removal of eastbound right-turn channelization 	<ul style="list-style-type: none"> • Acceptable intersection operations - Has the longest average intersection delay with the removal of eastbound right-turn channelization
	Geometrics & Safety	<ul style="list-style-type: none"> - SB right-turning large trucks impact the Cemetery stone wall - Slightly offset cross street intersection alignment • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Significantly improves cross street intersection alignment - Unconventional stop bar setback on west leg - Eliminates the eastbound channelized right-turn lane - Eliminates on-street parking in front of church - Minor impacts to 6 driveway approaches • No significant improvement for southbound right-turn truck movement • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Slightly improves cross street intersection alignment - Horizontal alignment deflection on Highway 138 - Unconventional stop bar setback on west leg - Minor impacts to 4 driveway approaches • No significant improvement for southbound right-turn truck movement • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Significantly improves cross street intersection alignment - Horizontal alignment deflection on Highway 138 - Eliminates the eastbound channelized right-turn lane - Eliminates on-street parking in front of church - Minor impacts to 7 driveway approaches • No significant improvement for southbound right-turn truck movement • No measurable pedestrian safety differences between alternatives
	Constructability	<ul style="list-style-type: none"> + No construction required 	<ul style="list-style-type: none"> - Significant impacts to traffic during construction 	<ul style="list-style-type: none"> - Significant impacts to traffic during construction 	<ul style="list-style-type: none"> - Significant impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> + No cost 	<ul style="list-style-type: none"> - Approximate total cost of \$2.60M 	<ul style="list-style-type: none"> • Approximate total cost of \$1.85M 	<ul style="list-style-type: none"> - Approximate total cost of \$2.74M

Category	Criteria	Alternative			
		Do Nothing	D1	D2	D3
Social & Cultural Environment	Business & Property	+ No impacts to properties	<ul style="list-style-type: none"> – One business property buyout – One residential property buyout • Minor property acquisition from 3 properties 	<ul style="list-style-type: none"> – One business property buyout – Minor property acquisition from 8 properties 	<ul style="list-style-type: none"> – One business property buyout – One residential property buyout – Minor property acquisition from 8 properties
	Built & Cultural Heritage	<ul style="list-style-type: none"> • No impacts to built or cultural heritage features in the study area 	<ul style="list-style-type: none"> • There are minor impacts to the St. Andrews West parking area but no direct impacts to heritage features • Impacts Evolving Historic Settlement cultural heritage feature (not designated under Part IV of the <i>Ontario Heritage Act</i>) and minor impacts to the St. Andrews West Church + Potential to minimize future impacts to the stone wall at Pioneer Cemetery 	<ul style="list-style-type: none"> • Minor impacts to the historically significant Quinn’s Inn property but no direct impacts to the building • Impacts Evolving Historic Settlement cultural heritage feature (not designated under Part IV of the <i>Ontario Heritage Act</i>) and minor impacts to the St. Andrews West Church + Potential to minimize future impacts to the stone wall at Pioneer Cemetery 	<ul style="list-style-type: none"> • Minor impacts to the St. Andrews West parking area but no direct impacts to heritage features • Minor impacts to the historically significant Quinn’s Inn property but no direct impacts to the building • Impacts Evolving Historic Settlement cultural heritage feature (not designated under Part IV of the <i>Ontario Heritage Act</i>) and minor impacts to the St. Andrews West Church + Potential to minimize future impacts to the stone wall at Pioneer Cemetery
	Archaeology	+ No impact	<ul style="list-style-type: none"> • Potential to impact potential unmarked graves outside of the cemetery boundary 	<ul style="list-style-type: none"> • Potential to impact potential unmarked graves outside of the cemetery boundary 	<ul style="list-style-type: none"> • Potential to impact potential unmarked graves outside of the cemetery boundary
Natural Environment	Terrestrial Ecosystem	<ul style="list-style-type: none"> • No impacts to vegetation 	<ul style="list-style-type: none"> • Approximately 150 m² of vegetation impacted 	<ul style="list-style-type: none"> • No impacts to vegetation 	<ul style="list-style-type: none"> • Approximately 140 m² of vegetation impacted
Overall Score		65	31	46	28

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Fish and Fish Habitat, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.3.5 Valade Road / Island Road

The following alternatives were considered at Valade Road / Island Road:

- “Do Nothing”
- E1 Northbound left-turn lane on Highway 138 with widening east of the centreline
- E2 Northbound left-turn lane on Highway 138 with widening on both sides of the centreline
- E3 Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline

A summary of the advantages and disadvantages of each alternative is provided in Table 8.

Table 8: Valade Road / Island Road – Alternative Advantages and Disadvantages

Category	Criteria	Alternative			
		Do Nothing	E1	E2	E3
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • Acceptable traffic operations • Negligible difference in overall intersection delay between alternatives – No operational benefit without northbound left-turn lane 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit + Southbound left-turn lane provides additional operational benefit • Negligible difference in overall intersection delay between alternatives
	Geometrics & Safety	<ul style="list-style-type: none"> – Does not satisfy warrant for northbound left-turn lane • No impact to driveways • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane + Left-turn lane constructed on right of centreline is preferred (with no opposing left-turn lane) – Minor impacts to 6 driveway approaches • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane • Left-turn lane constructed on centreline reduces horizontal alignment deflection – Minor impacts to 12 driveway approaches • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane • Left-turn lane constructed on centreline reduces horizontal alignment deflection + Centreline widening lends itself to an opposing southbound left-turn lane – Minor impacts to 12 driveway approaches • No measurable pedestrian safety differences between alternatives
	Constructability	<ul style="list-style-type: none"> + No construction required 	<ul style="list-style-type: none"> • Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> – More significant impacts to traffic during construction 	<ul style="list-style-type: none"> – More significant impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> + No cost 	<ul style="list-style-type: none"> • Approximate total cost of \$480,000 	<ul style="list-style-type: none"> – Approximate total cost of \$630,000 	<ul style="list-style-type: none"> – Approximate total cost of \$658,000

1.3.5.1 Preferred Alternative

A northbound left-turn lane is warranted at the Highway 138 Valade Road / Island Road intersection, based on traffic volumes and turning movements. A left-turn lane at this location will improve traffic operations.

The preferred alternative for Valade Road / Island Road is Alternative E3: Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline. Alternative E3 was selected as the preferred alternative at Valade Road/Island Road because it:

- Satisfies MTO’s warrant for a northbound left-turn lane
- Accommodates a southbound left-turn lane
- Improves the overall intersection operation
- Has minimal property impacts

Category	Criteria	Alternative			
		Do Nothing	E1	E2	E3
Social & Cultural Environment	Business & Property	+ No impacts to properties	- Minor impacts to 5 properties	• Minor impacts to 3 properties	• Minor impacts to 3 properties
	Terrestrial Ecosystem	• No impacts to vegetation	• Approximately 110 m ² of roadside vegetation impacted	• Approximately 100 m ² of roadside vegetation impacted	• Approximately 100 m ² of roadside vegetation impacted
Overall Score		55	51	52	56

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Built and Cultural Heritage, Archaeology, Fish and Fish Habitat, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.3.6 Wheeler Road

The following alternatives were considered at Wheeler Road:

- “Do Nothing”
- F1 Northbound left-turn lane on Highway 138 with widening east of the centreline
- F2 Northbound left-turn lane on Highway 138 with widening on both sides of the centreline

A summary of the advantages and disadvantages of each alternative is provided in Table 9.

1.3.6.1 Preferred Alternative

A northbound left-turn lane is warranted at the Highway 138 / Wheeler Road intersection based on traffic volumes and turning movements. A left-turn lane at this location will improve traffic operations.

Table 9: Wheeler Road – Alternative Advantages and Disadvantages

Category	Criteria	Alternative		
		Do Nothing	F1	F2
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • Acceptable traffic operations • Negligible difference in overall intersection delay between alternatives – No operational benefit without northbound left-turn lane 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives
	Geometrics & Safety	<ul style="list-style-type: none"> – Does not satisfy warrant for northbound left-turn lane • No impact to driveways • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane + Left-turn lane constructed on right of centreline is preferred at a T-intersection – Minor impacts to 3 driveway approaches • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane • Left-turn lane constructed on centreline reduces horizontal alignment deflection – Minor impacts to 3 driveway approaches • No measurable pedestrian safety differences between alternatives
	Constructability	<ul style="list-style-type: none"> + No construction required 	<ul style="list-style-type: none"> – Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> – Moderate impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> + No cost 	<ul style="list-style-type: none"> • Approximate total cost of \$211,000 	<ul style="list-style-type: none"> – Approximate total cost of \$314,000
Overall Score		47	62	52

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Business and Property, Noise, Land Use, Built and Cultural Heritage, Archaeology, Terrestrial Ecosystem, Fish and Fish Habitat, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

The preferred alternative for Wheeler Road is Alternative F1: Northbound left-turn lane on Highway 138 with widening east of the centreline. Alternative F1 was selected as the preferred alternative at Wheeler Road because it:

- Satisfies MTO’s warrant for a northbound left-turn lane
- Improves the overall intersection operation
- Has a left-turn lane constructed on the right of centerline, which is preferred at a T-intersection
- Has a lower cost when compared to Alternative F2
- Avoids impacts to the natural, social, and cultural environments

1.3.7 Myers Road / McPhail Road

The following alternatives were considered at Myers Road / McPhail Road:

- “Do Nothing”
- G1 Northbound left-turn lane on Highway 138 with widening east of the centreline
- G2 Northbound left-turn lane on Highway 138 with widening on both sides of the centreline
- G3 Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline

A summary of the advantages and disadvantages of each alternative is provided in Table 10.

1.3.7.1 Preferred Alternative

A northbound left-turn lane is warranted at the Highway 138 / Myers Road / McPhail Road intersection, based on traffic volumes and turning movements. A left-turn lane at this location will improve traffic operations.

The preferred alternative for Myers Road / McPhail Road is Alternative G3: Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline. Alternative G3 was selected as the preferred alternative at Myers Road/ McPhail Road because it:

- Satisfies MTO’s warrant for a northbound left-turn lane
- Improves the overall intersection operation
- Provides a southbound left-turn lane
- Has minimal property impacts

Table 10: Myers Road / McPhail Road – Alternative Advantages and Disadvantages

Category	Criteria	Alternative			
		Do Nothing	G1	G2	G3
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • Acceptable traffic operations • Negligible difference in overall intersection delay between alternatives – No operational benefit without northbound left-turn lane 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives 	<ul style="list-style-type: none"> + Northbound left-turn lane provides operational benefit + Southbound left-turn lane provides operational benefit • Negligible difference in overall intersection delay between alternatives
	Geometrics & Safety	<ul style="list-style-type: none"> – Does not satisfy warrant for northbound left-turn lane • No impact to driveways • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane + Left-turn lane constructed on right of centreline is preferred (with no opposing left-turn lane) – Minor impacts to 3 driveway approaches • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane • Left-turn lane constructed on centreline reduces horizontal alignment deflection – Minor impacts to 3 driveway approaches • No measurable pedestrian safety differences between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for northbound left-turn lane • Left-turn lane constructed on centreline reduces horizontal alignment deflection + Centreline widening lends itself to an opposing southbound left-turn lane – Minor impacts to 3 driveway approaches • No measurable pedestrian safety differences between alternatives
	Constructability	<ul style="list-style-type: none"> • No construction required 	<ul style="list-style-type: none"> – Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> – More significant impacts to traffic during construction 	<ul style="list-style-type: none"> – More significant impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> • No cost 	<ul style="list-style-type: none"> – Approximate total cost of \$303,000 	<ul style="list-style-type: none"> – Approximate total cost of \$428,000 	<ul style="list-style-type: none"> – Approximate total cost of \$469,000

Category	Criteria	Alternative			
		Do Nothing	G1	G2	G3
Social & Cultural Environment	Business & Property	<ul style="list-style-type: none"> No impacts to properties 	<ul style="list-style-type: none"> Minor impacts to one residential property 	<ul style="list-style-type: none"> Minor impacts to one residential property 	<ul style="list-style-type: none"> Minor impacts to one residential property
	Terrestrial Ecosystem	<ul style="list-style-type: none"> No impacts to vegetation 	<ul style="list-style-type: none"> Approximately 10 m² of vegetation impacted 	<ul style="list-style-type: none"> Approximately 20 m² of vegetation impacted 	<ul style="list-style-type: none"> Approximately 20 m² of vegetation impacted
Natural Environment	Fish & Fish Habitat	<ul style="list-style-type: none"> There are no new culverts or culvert extensions required There are no fish-bearing watercourses impacted 	<ul style="list-style-type: none"> 1 crossing extension of a watercourse that provides fish habitat Impacts approximately 25 m² of the Beaver Creek Tributary / Glenco Branch and Spur to the Benneville Drain 	<ul style="list-style-type: none"> 1 crossing extension of a watercourse that provides fish habitat Impacts approximately 25 m² of the Beaver Creek Tributary / Glenco Branch and Spur to the Benneville Drain 	<ul style="list-style-type: none"> 1 crossing extension of a watercourse that provides fish habitat Impacts approximately 25 m² of the Beaver Creek Tributary / Glenco Branch and Spur to the Benneville Drain
	Overall Score		44	45	43

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Noise, Land Use, Built and Cultural Heritage, Archaeology, Species of Conservation Concern, and Environmentally Sensitive / Designated Areas

1.4 EVALUATION OF PASSING LANE ALTERNATIVES

Plans showing the passing lane alternatives are provided in Appendix B.

1.4.1 Advantages and Disadvantages

A summary of the advantages and disadvantages of each alternative is provided in Table 11.

1.4.2 Preferred Alternative

Further to the Screening Evaluation, one northbound and one southbound passing lane are required to improve traffic operations along the highway corridor. Two northbound and two southbound alternatives were developed and evaluated based on preliminary locations for northbound and southbound passing lane alternatives identified in the *Traffic Operations and Safety Review (2014)*.

The preferred passing lane alternatives are Alternative NB1: Headline Road to County Road 43 – between Myers Road and Guindon Road, and Alternative SB1: Headline Road to County Road 43 – between Red Schoolhouse Road and County Road 43. Alternatives NB-1 and SB-1 were selected as the preferred alternatives because:

- They satisfy the passing lane analysis warrant that identifies a need to provide assured passing opportunities
- They provide the greatest safety improvement since they are located in areas with higher traffic volumes and a lack of passing opportunities
- They provide a significant improvement to both total travel time and percent time spent following other vehicles

No significant operational or natural, social, or cultural impacts were identified with the remaining alternatives. Alternatives NB 2 and SB 2 are viable passing lane locations if a need is identified in the future based on changes to traffic volumes or operations in the study area. The need for a second set of additional passing lanes is outside of the planning horizon of the current study. A separate environmental assessment study would be required to identify the need for and complete environmental requirements at that time.

Table 11: Passing Lane – Alternative Advantages and Disadvantages

Category	Criteria	Alternative			
		NB-1	SB-1	NB-2	SB-2
Highway Engineering	Traffic Operations	<ul style="list-style-type: none"> • Minor Level of Service improvement compared to existing + Reduces the % Time Spent Following + Reduces Total Travel Time + Required Assured Passing Opportunity>Available Assured Passing Opportunity 	<ul style="list-style-type: none"> • Minor Level of Service improvement compared to existing + Reduces the % Time Spent Following + Reduces Total Travel Time + Required Assured Passing Opportunity>Available Assured Passing Opportunity 	<ul style="list-style-type: none"> • Minor Level of Service improvement compared to existing • Reduces the % Time Spent Following less than NB-1 • Reduces Total Travel Time less than NB-1 – Required Assured Passing Opportunity< Available Assured Passing Opportunity 	<ul style="list-style-type: none"> • Minor Level of Service improvement compared to existing • Reduces the % Time Spent Following less than SB-1 • Reduces Total Travel Time less than SB-1 – Required Assured Passing Opportunity< Available Assured Passing Opportunity
	Geometrics & Safety	<ul style="list-style-type: none"> + Satisfies warrant for northbound passing lane + Provides greatest safety benefit + Located in a desirable area with a long vertical crest curve • Number and location of existing intersections and entrances is negligible between alternatives 	<ul style="list-style-type: none"> + Satisfies warrant for southbound passing lane + Provides greatest safety benefit + Located in a desirable area with a long vertical crest curve + Location will assist with potentially slower truck traffic stopped at signalized intersection • Number and location of existing intersections and entrances is negligible between alternatives 	<ul style="list-style-type: none"> • A northbound passing lane is not warranted in the north section • Does not provide the greatest safety benefit + Located in a desirable area with a long vertical crest curve • Number and location of existing intersections and entrances is negligible between alternatives 	<ul style="list-style-type: none"> • A southbound passing lane is not warranted in the north section • Does not provide the greatest safety benefit + Located in a desirable area with an upgrade for the entire length and a long vertical crest curve • Number and location of existing intersections and entrances is negligible between alternatives
	Constructability	<ul style="list-style-type: none"> • Can be constructed using conventional construction techniques • Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> • Can be constructed using conventional construction techniques • Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> • Can be constructed using conventional construction techniques • Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> • Can be constructed using conventional construction techniques • Moderate impacts to traffic during construction
	Total Cost	<ul style="list-style-type: none"> • Approximate total cost of \$1.82M 	<ul style="list-style-type: none"> • Approximate total cost of \$1.72M 	<ul style="list-style-type: none"> • Approximate total cost of \$1.53M 	<ul style="list-style-type: none"> • Approximate total cost of \$1.42M

Category	Criteria	Alternative			
		NB-1	SB-1	NB-2	SB-2
Social & Cultural Environment	Business & Property	– Impacts to 3 properties	– Impacts to 5 properties	– Impacts to 5 properties	– Impacts to 4 properties
	Noise	• Minimal potential for noise impacts	• Minimal potential for noise impacts	• Minimal potential for noise impacts	• Minimal potential for noise impacts
	Land Use	<ul style="list-style-type: none"> • No impacts to snowmobile crossings • No impacts to active farmland • No impact to aggregate and mineral reserves 	<ul style="list-style-type: none"> • No impacts to snowmobile crossings – Impacts approximately 2150 m² of active farmland • No impact to aggregate and mineral reserves 	<ul style="list-style-type: none"> – Passing lane is located at an existing OFSC trail crossing – Impacts approximately 3875 m² of active farmland – Minor property required from 3 licensed aggregate extraction areas 	<ul style="list-style-type: none"> – Passing lane is located at an existing OFSC trail crossing – Impacts approximately 1945 m² of active farmland. • No impact to aggregate and mineral reserves
	Built & Cultural Heritage	• Minor property required from a potential Cultural Heritage Landscape (CHL 10)	• Minor property required from a potential Cultural Heritage Landscape (CHL 10)	• There are no built/cultural heritage features in the study area	• There are no built/cultural heritage features in the study area
Natural Environment	Terrestrial Ecosystem	<ul style="list-style-type: none"> + No impacts to unevaluated wetlands • Approximately 65 m² of vegetation impacted – All alternatives impact potential SAR habitat 	<ul style="list-style-type: none"> + No impacts to unevaluated wetlands – Approximately 1390 m² of vegetation impacted – All alternatives impact potential SAR habitat 	<ul style="list-style-type: none"> – Approximately 1020 m² of unevaluated wetland impacted – Approximately 1540 m² of vegetation impacted – All alternatives impact potential SAR habitat 	<ul style="list-style-type: none"> – Approximately 200 m² of unevaluated wetland impacted – Approximately 1770 m² of vegetation impacted – All alternatives impact potential SAR habitat
	Fish & Fish Habitat	<ul style="list-style-type: none"> – Requires 3 culvert extensions at watercourses that provide fish habitat – Requires the potential realignment of an intermittent tributary – Impacts approximately 70 m² of fish-bearing watercourses 	<ul style="list-style-type: none"> – Requires 1 culvert extension of a watercourse that provides fish habitat – Impacts approximately 15 m² of a fish-bearing watercourse 	<ul style="list-style-type: none"> – Requires 1 culvert extension of a watercourse that provides fish habitat – Impacts approximately 20 m² of a fish-bearing watercourse 	<ul style="list-style-type: none"> – Requires 1 culvert extension of a watercourse that provides fish habitat – Requires realignment of approximately 100 metres of a watercourse that provides fish habitat – Impacts approximately 15 m² of a fish-bearing watercourse
	Species of Conservation Concern	<ul style="list-style-type: none"> • Potential impacts to Threatened / Endangered Species-at-Risk • Potential impacts to Threatened / Endangered Species-at-Risk habitat 	<ul style="list-style-type: none"> • Potential impacts to Threatened / Endangered Species-at-Risk • Potential impacts to Threatened / Endangered Species-at-Risk habitat 	<ul style="list-style-type: none"> • Potential impacts to Threatened / Endangered Species-at-Risk • Potential impacts to Threatened / Endangered Species-at-Risk habitat 	<ul style="list-style-type: none"> • Potential impacts to Threatened / Endangered Species-at-Risk • Potential impacts to Threatened / Endangered Species-at-Risk habitat
	Environmentally sensitive areas, Designated Areas	<ul style="list-style-type: none"> • No Sourcewater Protection Areas in the study area • Does not impact the Newington Provincially Significant Wetland 	<ul style="list-style-type: none"> • No Sourcewater Protection Areas in the study area – Impacts approximately 1770 m² of the Newington Provincially Significant Wetland 	<ul style="list-style-type: none"> • Does not impact the Newington Provincially Significant Wetland • Requires construction within approximately 6975 m² of wellhead protection area 	<ul style="list-style-type: none"> • No Sourcewater Protection Areas in the study area • Does not impact the Newington Provincially Significant Wetland
Overall Score		57	55	37	37

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Archaeology

1.5 EVALUATION OF CARPOOL LOT ALTERNATIVES

Plans showing the Carpool Lot Alternatives are provided in Appendix B.

1.5.1 Preferred Alternatives

The screening evaluation discussed in Section 1.2.1 determined that two locations for Carpool Lots should be selected at the following locations:

- Carpool parking in the vicinity of Highway 401
- Carpool parking mid-block between Highway 401 and Highway 417 (one location)

The two carpool lots that were developed for consideration in the vicinity of Highway 417 did not meet the screening requirements and were not carried forward to the detailed evaluation. An environmental assessment study would be required to move forward with either site.

A detailed evaluation was completed to confirm if there are significant natural, social, or cultural impacts within each of the site alternatives. A summary of the advantages and disadvantages of each alternative is provided in Table 12.

1.5.1.1 Highway 401 Area

The preferred alternative for the Highway 401 area is Alternative 1, a carpool lot on the north side of Cornwall Centre Road, east of Brookdale Avenue. Alternative 1 was selected as the preferred alternative because:

- It is located in an area where there is demand for carpool / commuter parking
- It is located near a Highway 401 interchange to attract a broad cross-section of users
- There is good access and minimal impacts to the natural, social, and cultural environments

1.5.1.2 Mid-Block

The preferred alternative for the mid-block site is Alternative 2, a carpool lot in St. Andrews, on the east side of Highway 138, approximately 1.0 km north of Dundas Street. Alternative 2 was selected as the preferred alternative because:

- It is located in an area where there is demand for carpool / commuter parking
- There is good access and minimal impacts to the natural, social, and cultural environments

Table 12: Carpool Lots – Alternative Advantages and Disadvantages

Category	Criteria	Alternative		
		1	2	3
Highway Engineering	Site Location	+ Near Highway 401 interchange	+ Approximately 1.0 km north of St. Andrews (existing parking) – Approximately 17.0 km south of Highway 417	+ Near existing parking at Monkland – Approximately 17.0 km south of Highway 417
	Geometrics & Safety	+ Located on a tangent section of the highway alignment + Located on very flat section of the highway	+ Located on a tangent section of the highway alignment • Located on fairly flat section of the highway, near the bottom of a 2% grade	+ Located on a tangent section of the highway alignment + Located on very flat section of the highway
	Site Characteristics	+ Site very flat, can be constructed using conventional construction techniques + Good access opportunity + Convenient utility services	+ Site very flat, can be constructed using conventional construction techniques + Good access opportunity + Convenient utility services	+ Site very flat, can be constructed using conventional construction techniques – Access may conflict with County Road 43 turning lanes – Access close to CP Railway (100 m south) + Convenient utility services
	Total Cost	• Cost similar to locations C2 & C3	• Cost similar to locations C1 & C3	• Cost similar to locations C1 & C2
Natural Environment	Terrestrial Ecosystem	– Approximately 4600 m ² of vegetation impacted	– Approximately 5750 m ² of vegetation impacted	– Approximately 4650 m ² of vegetation impacted
	Fish & Fish Habitat	+ There are no new culverts or culvert extensions required + There are no fish-bearing watercourses impacted	+ There are no new culverts or culvert extensions required + There are no fish-bearing watercourses impacted	– One new crossing of a watercourse that provides fish habitat – Impacts approximately 20 m ² of the Monkland Drain / McDonald – Kennedy Branch
	Species of Conservation Concern	• No impact to rare species • No impact to potential rare species habitat	• No impact to rare species • No impact to potential rare species habitat	– Potential to impact rare species – Potential to impact rare species habitat
Overall Score		74	56	52

* The following factors that are relevant to this study were not present in this study area or had minor impacts in the same degree or in the same way for all of the alternatives: Business & Property, Land Use, Noise, Built and Cultural Heritage, Archaeology, Species of Conservation Concern

This page intentionally left blank.

Appendix A: Evaluation Scoring and Evaluation Data



EVALUATION SCORING – Intersection Alternative Evaluation
Brookdale Avenue

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	0	2	0%	0.0%
		Geometrics & Safety	15.5%	2	3	0	58%	9.0%
		Constructability	2.0%	1	0	0	100%	2.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	1	1	0	75%	11.6%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	1	0	0	100%	3.0%
		Fish & Fish Habitat	3.0%	2	0	0	100%	3.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	8	11	2		48.9%

Alternative A1– Northbound Right-Turn Channelization

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	0	0	100%	28.0%
		Geometrics & Safety	15.5%	3	2	0	80%	12.4%
		Constructability	2.0%	0	1	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	1	25%	3.9%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	12	3		63.3%

Alternative A2 – Realign Intersection

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	3	0	0	100%	28.0%
		Geometrics & Safety	15.5%	0	2	3	20%	3.1%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	1	25%	3.9%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	10	8		49.2%



EVALUATION DATA – Intersection Alternative Evaluation Brookdale Avenue

Highway Engineering

	Do Nothing	A1	A2
Traffic Operations			
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 9 & 11 (AM) &(PM) EB =<1, NB=15, WB=8 (AM) EB =<1, NB=17, WB=7 (PM) 	<ul style="list-style-type: none"> Overall 8 & 9 (AM) &(PM) EB =<1, NB=13, WB=8 (AM) EB =<1, NB=13, WB=7 (PM) 	<ul style="list-style-type: none"> Overall 3 & 3 (AM) &(PM) EB =16, NB=2, WB=<1 (AM) EB =19, NB=1, WB=<1 (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB =<1, NB=14, WB=19 (AM) EB =<1, NB=34, WB=6 (PM) 	<ul style="list-style-type: none"> EB =<1, NB=7, WB=9 (AM) EB =<1, NB=18, WB=6 (PM) 	<ul style="list-style-type: none"> EB =8, NB=1, WB=<1 (AM) EB =9, NB=14, WB=<1 (PM)
Geometrics & Safety			
Geometrics and Safety	<ul style="list-style-type: none"> NB has stop condition 	<ul style="list-style-type: none"> Channelized right-turn lane curve R-45 m meets standards 	<ul style="list-style-type: none"> T-intersection on curve Mainline horizontal curve is R-90 m (meets 50 km/h D.S. = posted speed)
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> No impact
Constructability			
Construction Feasibility	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Minimal impacts to traffic during construction 	<ul style="list-style-type: none"> Significant impacts to traffic during construction
Cost			
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$127,000 Utilities \$18,000 Property \$4,000 Total \$149,000 	<ul style="list-style-type: none"> Construction \$316,000 Utilities \$18,000 Property \$7,000 Total \$341,000

Social & Cultural Environment

	Do Nothing	A1	A2
Business & Property			
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.01ha (Cornwall Mazda) 	<ul style="list-style-type: none"> Requires purchase of 0.02 ha of land from Cornwall Mazda
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impact to potential future development 	<ul style="list-style-type: none"> No impact to potential future development 	<ul style="list-style-type: none"> Has the potential to improve egress from proposed future development in the southwest quadrant
Noise			
Potential for Noise Increase	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 		
Land Use			
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 		
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 		
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 		
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> The proposed minor property required is adjacent to the existing highway right-of-way and is not considered to be within a potentially contaminated area 	
Built & Cultural Heritage			
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> There are no registered built heritage or cultural features in the study area 		
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 		
Archaeology			
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 		

Natural Environment

	Do Nothing	A1	A2
Terrestrial Ecosystem			
Unevaluated Wetlands	<ul style="list-style-type: none"> There are no unevaluated wetlands in the study area 		
Impact to Significant Trees	<ul style="list-style-type: none"> There are no trees within the study area 		
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 100 m²) 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 200 m²)
Fish & Fish Habitat			
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings required 	<ul style="list-style-type: none"> Requires two new crossings of an unnamed tributary that provides seasonal fish habitat (Crossing ID 24) 	<ul style="list-style-type: none"> Requires two new crossings of an unnamed tributary that provides seasonal fish habitat (Crossing ID 24)
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 	<ul style="list-style-type: none"> Approximately 230 m² 	<ul style="list-style-type: none"> Approximately 305 m²
Species of Conservation Concern			
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 		
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species are within the study area 		
Environmentally Sensitive Areas, Designated Areas			
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 		
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 		

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	1	1	25%	7.0%
		Geometrics & Safety	15.5%	0	1	1	25%	3.9%
		Constructability	2.0%	0	1	0	50%	1.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	1	12	2		42.9%

Alternative B1– Improved Corner Radius

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	3	0	2	60%	9.3%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	10	4		49.8%

Alternative B2 – Channelized Right-turn Lane

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	3	1	2	58%	9.0%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	10	5		45.8%

Highway Engineering

	Do Nothing	B1	B2
Traffic Operations			
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 20 & 25 (AM) & (PM) SB=23 (AM) SB=30 (PM) 	<ul style="list-style-type: none"> Overall 20 & 25 (AM) & (PM) SB=23 (AM) SB=30 (PM) 	<ul style="list-style-type: none"> Overall 20 & 25 (AM) & (PM) SB=23 (AM) SB=30 (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> SBR=14 (AM) SBR=16 (PM) 	<ul style="list-style-type: none"> SBR=14 (AM) SBR=16 (PM) 	<ul style="list-style-type: none"> SBR=14 (AM) SBR=16 (PM)
Geometrics & Safety			
Geometrics and Safety	<ul style="list-style-type: none"> Large trucks have difficulty with SB right-turn 	<ul style="list-style-type: none"> Improved SB turn radius for large trucks Longer walk distance for pedestrians crossing north leg 	<ul style="list-style-type: none"> Improved SB turn radius for large trucks Channelized island provides refuge for pedestrians on crossing north leg
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Minor impact to 1 driveway 	<ul style="list-style-type: none"> Minor impact to 1 driveway
Constructability			
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction
Cost			
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$44,000 Utilities \$37,000 Property \$5,000 Total \$86,000 	<ul style="list-style-type: none"> Construction \$64,000 Utilities \$46,000 Property \$7,000 Total \$117,000

Social & Cultural Environment

	Do Nothing	B1	B2
Business & Property			
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.01 ha of land from 1 property (Stephen Fitzgerald Motors) 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.02 ha of land from 1 property (Stephen Fitzgerald Motors)
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impacts to potential future development 		
Noise			
Potential for Noise Increase	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 		
Land Use			
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 		
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 		
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 		
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> The proposed minor property required is adjacent to the existing highway right-of-way and is not considered to be within a potentially contaminated area 	
Built & Cultural Heritage			
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> There are no registered built heritage or cultural features in the study area 		
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 		
Archaeology			
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 		

Natural Environment

	Do Nothing	B1	B2
Terrestrial Ecosystem			
Unevaluated Wetlands	<ul style="list-style-type: none"> There are no unevaluated wetlands in the study area 		
Impact to Significant Trees	<ul style="list-style-type: none"> There are no trees within the study area 		
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 		
Fish & Fish Habitat			
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossing required 		
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 		
Species of Conservation Concern			
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 		
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified within the study area 		
Environmentally Sensitive Areas, Designated Areas			
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 		
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 		

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	0	2	0%	0.0%
		Geometrics & Safety	15.5%	1	0	5	17%	2.6%
		Constructability	2.0%	1	0	0	100%	2.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	1	0	0	100%	15.5%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	2	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	10	7		43.3%

Alternative C1– Signalized intersection with left-turn lanes

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	2	0	50%	14.0%
		Geometrics & Safety	15.5%	3	3	0	75%	11.6%
		Constructability	2.0%	0	1	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	1	25%	0.8%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	15	1		53.1%

Alternative C2 – Roundabout

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	3	0	0	100%	28.0%
		Geometrics & Safety	15.5%	7	1	1	83%	12.9%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	2	0%	0.0%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	9	7	6		55.2%

Highway Engineering

	Do Nothing	C1	C2
Traffic Operations			
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 11 & 128(AM)&(PM) EB=20, WB=20, NB=5, SB=10, (AM) EB=15, WB =15, NB=76, SB=223, (PM) 	<ul style="list-style-type: none"> Overall 9 & 16 (AM) &(PM) EB=16, WB=16, NB=6, SB=7, (AM) EB=15, WB=16, NB=16, SB=15, (PM)) 	<ul style="list-style-type: none"> All approaches <10s delay AM & PM
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB=12, WB=10, NB=23, SB=102 (AM) EB=9, WB=3, NB=131, SB=144 (PM) 	<ul style="list-style-type: none"> EB=12, WB=10, NB=22, SB=51 (AM) EB=8, WB=11, NB=75, SB=61 (PM) 	<ul style="list-style-type: none"> All approaches <25m 95th percentile queue AM & PM
Geometrics & Safety			
Geometrics and Safety	<ul style="list-style-type: none"> Does not satisfy MTO commitment to provide signals or a roundabout NB & SB left-turn lanes are warranted Pedestrian and cyclist accommodations not present Collision frequency: approx. 15 collisions expected over 10 years Collision severity: Fatal & serious injury collisions possible 	<ul style="list-style-type: none"> Satisfies MTO commitment to provide signals or a roundabout Provides warranted NB & SB left-turn lanes Pedestrian and cyclist accommodations moderately improved Collision frequency: approx. 10 collisions expected over 10 years Collision severity: Fatal & serious injury collisions possible 	<ul style="list-style-type: none"> Satisfies MTO commitment to provide signals or a roundabout Provides equivalent to warranted NB & SB left-turn lanes Pedestrian and cyclist accommodations significantly improved Collision frequency: approx. 6 collisions expected over 10 years Collision severity: Fatal & serious injury collisions unlikely
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Impact to 1 driveway 	<ul style="list-style-type: none"> Impacts 3 driveways
Constructability			
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Significant impacts to traffic during construction
Cost			
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$1,056,000 Utilities \$86,000 Property \$7,000 Total \$1,149,000 	<ul style="list-style-type: none"> Construction \$1,747,000 Utilities \$94,000 Property \$10,000 Total \$1,851,000

Social & Cultural Environment

	Do Nothing	C1	C2
Business & Property			
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Requires purchase of 0.05 ha of land from 1 property 	<ul style="list-style-type: none"> Requires purchase of 0.12 ha of land from 3 properties
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impacts to future development 	<ul style="list-style-type: none"> No impacts to new self-storage and go-kart development proposed north of Headline Road 	<ul style="list-style-type: none"> No impact to future development
Noise			
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 		
Land Use			
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 		
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 		
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 		
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> There are no potentially contaminated properties within the study area 		
Built & Cultural Heritage			
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> There are no registered built heritage or cultural features in the study area 		
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 		
Archaeology			
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 		

Natural Environment

	Do Nothing	C1	C2
Terrestrial Ecosystem			
Unevaluated Wetlands	<ul style="list-style-type: none"> No unevaluated wetlands impacted 	<ul style="list-style-type: none"> No unevaluated wetlands impacted 	<ul style="list-style-type: none"> 100 m² of unevaluated wetlands impacted
Impact to Significant Trees	<ul style="list-style-type: none"> No significant trees within the study area 	<ul style="list-style-type: none"> No significant trees within the study area 	<ul style="list-style-type: none"> No significant trees within the study area
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation and edge of woodlot (320 m²) 	<ul style="list-style-type: none"> Vegetation removal of roadside vegetation and edge of woodlot (820 m²)
Fish & Fish Habitat			
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings required 		
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 		
Species of Conservation Concern			
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 		
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified within the study area 		
Environmentally Sensitive Areas, Designated Areas			
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 		
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 		

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	0	1	2	17%	2.6%
		Constructability	2.0%	1	0	0	100%	2.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	1	0	0	100%	15.5%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	1	0	0	100%	2.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	5	9	2		65.3%

Alternative D1– Major realignment of Dundas Street

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	1	1	25%	7.0%
		Geometrics & Safety	15.5%	1	2	4	29%	4.4%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	2	17%	2.6%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	1	2	0	67%	3.3%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	12	9		30.6%

Alternative D2 – Minor realignment of Dundas Street and minor shift of Highway 138 to the east

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	2	1	3	33%	5.2%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	2	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	1	2	0	67%	3.3%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	12	6		46.5%

Alternative D3 – Major realignment of Dundas Street and minor shift of Highway 138 to the east

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	1	1	25%	7.0%
		Geometrics & Safety	15.5%	2	1	4	29%	4.4%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	3	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	1	3	0	63%	3.1%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	12	10		27.8%

Highway Engineering

	Do Nothing	D1	D2	D3
Traffic Operations				
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 9 & 10 (AM)&(PM) EB=7, WB=24, NB=7, SB=8, (AM) EB=14, WB=26, NB=10, SB=7, (PM) 	<ul style="list-style-type: none"> Overall 11 & 12 (AM) &(PM) EB=21, WB=22, NB=7, SB=8, (AM) EB=22, WB=23, NB=12, SB=8, (PM)) 	<ul style="list-style-type: none"> Overall 9 & 10 (AM) &(PM) EB=7, WB=24, NB=7, SB=8, (AM) EB=14, WB=26, NB=10, SB=7, (PM) 	<ul style="list-style-type: none"> Overall 11 & 12 (AM) &(PM) EB=21, WB=22, NB=7, SB=8, (AM) EB=22, WB=23, NB=12, SB=8, (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB=11, WB=19, NB=33, SB=56 (AM) EB=14, WB=17, NB=100, SB=55 (PM) 	<ul style="list-style-type: none"> EB=16, WB=19, NB=34, SB=57 (AM) EB=18, WB=17, NB=101, SB=56 (PM) 	<ul style="list-style-type: none"> EB=11, WB=19, NB=33, SB=56 (AM) EB=14, WB=17, NB=100, SB=55 (PM) 	<ul style="list-style-type: none"> EB=16, WB=19, NB=34, SB=57 (AM) EB=18, WB=17, NB=101, SB=56 (PM)
Geometrics & Safety				
Geometrics and Safety	<ul style="list-style-type: none"> SB right-turning large trucks continue to damage the Cemetery stone wall East side paved shoulder on south leg, utilized to pass stopped vehicles Sidewalk edge on north-west corner flush with road surface 	<ul style="list-style-type: none"> Significantly improved cross street intersection alignment Eliminates the eastbound channelized right-turn lane Requires stop bar on west leg to be moved approx. 10 m further back 	<ul style="list-style-type: none"> Slightly improved cross street intersection alignment Introduces horizontal alignment deflection on Highway 138 through the intersection Requires stop bar on west leg to be moved approx. 12 m further back 	<ul style="list-style-type: none"> Significantly improved cross street intersection alignment Eliminates the eastbound channelized right-turn lane Introduces horizontal alignment deflection on Highway 138 through the intersection Improves SB right-turn for large trucks
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Impacts to 6 driveways Eliminates approx. 13 on-street parking spaces in front of St. Andrew's Church 	<ul style="list-style-type: none"> Impacts to 4 driveways 	<ul style="list-style-type: none"> Impacts to 7 driveways Eliminates approx. 13 on-street parking spaces in front of St. Andrew's Church
Constructability				
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Significant impacts to traffic during construction 	<ul style="list-style-type: none"> Significant impacts to traffic during construction 	<ul style="list-style-type: none"> Significant impacts to traffic during construction
Cost				
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No Cost 	<ul style="list-style-type: none"> Construction\$1,530,000 Utilities \$238,000 Property \$820,000 Total \$2,588,000 	<ul style="list-style-type: none"> Construction\$1,152,000 Utilities \$159,000 Property \$535,000 Total \$1,846,000 	<ul style="list-style-type: none"> Construction\$1,650,000 Utilities \$243,000 Property \$845,000 Total \$2,738,000

Social & Cultural Environment

	Do Nothing	D1	D2	D3
Business & Property				
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Minor property acquisition requires purchase of 0.08 ha of land from 3 properties, and 2 property buyouts Property impact to St. Andrews Catholic Church and loss of approximately 13 on-street parking spaces on Dundas Street Commercial property buyout impacting Stephen P. Mesman Investment and Insurance Advisor, Crossroads Convenience Store, and St. Andrews Post Office Minor property impact to Quinn's Inn 	<ul style="list-style-type: none"> Minor property acquisition requires purchase of 0.04 ha of land from 8 properties, and 1 property buyout Commercial property buyout impacting Stephen P. Mesman Investment and Insurance Advisor, Crossroads Convenience Store, and St. Andrews Post Office Minor property impact to Quinn's Inn 	<ul style="list-style-type: none"> Minor property acquisition requires purchase of 0.11 ha of land from 8 properties, and 2 property buyouts Property impact to St. Andrews Catholic Church and loss of approximately 13 on-street parking spaces on Dundas Street Commercial property buyout impacting Stephen P. Mesman Investment and Insurance Advisor, Crossroads Convenience Store, and St. Andrews Post Office Minor property impact to Quinn's Inn
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impact to potential future development 			
Noise				
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 			
Land Use				
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 			
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 			
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 			
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> No impact to potentially contaminated property 		

Social & Cultural Environment

	Do Nothing	D1	D2	D3
Built & Cultural Heritage				
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> There are minor impacts to the St. Andrews West parking area but no direct impacts to heritage features Impacts Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the southeast intersection quadrant Minor impacts to Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the southwest intersection quadrant Has the potential to require construction in an area with the potential for unmarked graves 	<ul style="list-style-type: none"> Minor impacts to built heritage feature's property (Quinn's Inn – Designated under Part IV of the <i>Ontario Heritage Act</i>), but building is not impacted) Impacts Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the southeast intersection quadrant Minor impacts to Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the northeast intersection quadrant Has the potential to require construction in an area with the potential for unmarked graves 	<ul style="list-style-type: none"> Minor impacts to built heritage feature's property (Quinn's Inn – Designated under Part IV of the <i>Ontario Heritage Act</i>), but building is not impacted Impacts Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the southwest and southeast intersection quadrants Minor impacts to Evolving Historic Settlement (cultural heritage landscape – not designated under Part IV of the <i>Ontario Heritage Act</i>) properties in the northeast intersection quadrant Has the potential to require construction in an area with the potential for unmarked graves
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> No impact to the stone wall at Pioneer Cemetery 			
Archaeology Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 			

Natural Environment

	Do Nothing	D1	D2	D3
Terrestrial Ecosystem				
Unevaluated Wetlands	<ul style="list-style-type: none"> There are no unevaluated wetlands within the study area 			
Impact to Significant Trees	<ul style="list-style-type: none"> No impact to significant trees 	<ul style="list-style-type: none"> No impact to significant trees 	<ul style="list-style-type: none"> No impact to significant trees 	<ul style="list-style-type: none"> No impact to significant trees
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 150 m²) 	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 140 m²)
Fish & Fish Habitat				
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings required 	<ul style="list-style-type: none"> No new crossings required 	<ul style="list-style-type: none"> No new crossings required 	<ul style="list-style-type: none"> No new crossings required
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 	<ul style="list-style-type: none"> No impact to fish or fish habitat 	<ul style="list-style-type: none"> No impact to fish or fish habitat 	<ul style="list-style-type: none"> No impact to fish or fish habitat
Species of Conservation Concern				
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 			
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified within the study area 			
Environmentally Sensitive Areas, Designated Areas				
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 			
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 			

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	2	1	33%	9.3%
		Geometrics & Safety	15.5%	0	2	1	33%	5.2%
		Constructability	2.0%	1	0	0	100%	2.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	1	0	0	100%	15.5%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	12	2		55.3%

Alternative E1– Northbound left-turn lane on Highway 138 with widening east of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	2	1	1	63%	9.7%
		Constructability	2.0%	0	1	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	12	2		51.2%

Alternative E2 – Northbound left-turn lane on Highway 138 with widening on both sides of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	1	2	1	50%	7.8%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	2	12	3		52.3%

Alternative E3 – Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	2	1	0	83%	23.3%
		Geometrics & Safety	15.5%	2	2	1	60%	9.3%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	12	3		56.1%

Highway Engineering

	Do Nothing	E1	E2	E3
Traffic Operations				
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 1 & 1 (AM)&(PM) EB=13, WB=18, NB=<1, SB=<1, (AM) EB=14, WB=23, NB=1, SB=<1, (PM) 	<ul style="list-style-type: none"> Overall 1 & 1 (AM) &(PM) EB=13, WB=18, NB=8, SB=<1, (AM) EB=14, WB=23, NB=9, SB=<1, (PM)) 	<ul style="list-style-type: none"> Overall 1 & 1 (AM) &(PM) EB=13, WB=18, NB=8, SB=<1, (AM) EB=14, WB=23, NB=9, SB=<1, (PM) 	<ul style="list-style-type: none"> Overall 1 & 1 (AM) &(PM) EB=13, WB=18, NB=8, SB=8, (AM) EB=14, WB=23, NB=9, SB=8, (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB=1, WB=2, NB=<1, SB=<1 (AM) EB=1, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=1, WB=2, NB=<1, SB=<1 (AM) EB=1, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=1, WB=2, NB=<1, SB=<1 (AM) EB=1, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=1, WB=2, NB=<1, SB=<1 (AM) EB=1, WB=2, NB=1, SB=<1 (PM)
Geometrics & Safety				
Geometrics and Safety	<ul style="list-style-type: none"> A NB left-turn lane is warranted 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on right of centreline is preferred when an opposing left-turn lane is not warranted (Section E.9.1, GDSOH) 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on centreline reduces horizontal deflection and reduces east side property impacts 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane Provides opposing SB left-turn lane LTL constructed on centreline reduces horizontal alignment deflection, reduces east side property impacts, and provides for a better opportunity to provide the opposing left-turn lane at a cross intersection
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Minor impact to 6 driveways 	<ul style="list-style-type: none"> Minor impact to 12 driveways 	<ul style="list-style-type: none"> Minor impact to 12 driveways
Constructability				
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction
Cost				
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$280,000 Utilities \$187,500 Property \$12,500 Total \$480,000 	<ul style="list-style-type: none"> Construction \$407,000 Utilities \$216,000 Property \$7,000 Total \$630,000 	<ul style="list-style-type: none"> Construction \$435,000 Utilities \$216,000 Property \$7,000 Total \$658,000

Social & Cultural Environment

	Do Nothing	E1	E2	E3
Business & Property				
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.05 ha of land from 5 properties 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.03 ha of land from 3 properties 	<ul style="list-style-type: none"> Minor property acquisition Requires purchase of 0.03 ha of land from 3 properties
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impact to potential future development 			
Noise				
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 			
Land Use				
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 			
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 			
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 			
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> There is no contaminated property within the study area 			
Built & Cultural Heritage				
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> There are no registered built heritage or cultural features in the study area 			
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 			
Archaeology				
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 			
Natural Environment				
Terrestrial Ecosystem				
Unevaluated Wetlands	<ul style="list-style-type: none"> There are no unevaluated wetlands in the study area 			
Impact to Significant Trees	<ul style="list-style-type: none"> No impact to significant trees 			
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (110 m²) 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (100 m²) 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (100 m²)
Fish & Fish Habitat				
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings required 			
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish Habitat 			
Species of Conservation Concern				
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 			
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified within the study area 			
Environmentally Sensitive Areas, Designated Areas				
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 			
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 			

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	2	1	33%	9.3%
		Geometrics & Safety	15.5%	0	2	1	33%	5.2%
		Constructability	2.0%	1	0	0	100%	2.0%
		Cost	7.5%	1	0	0	100%	7.5%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	2	13	2		47.5%

Alternative F1– Northbound left-turn lane on Highway 138 with widening east of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	2	1	1	63%	9.7%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	1	1	0	75%	11.6%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	12	2		61.8%

Alternative F2 – Northbound left-turn lane on Highway 138 with widening on both sides of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	1	2	1	50%	7.8%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	1	0	50%	1.5%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	2	12	3		52.3%

Highway Engineering

	Do Nothing	F1	F2
Traffic Operations			
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 1 & 1 (AM)&(PM) EB=12, NB=<1 (AM) EB=13, NB=1 (PM) 	<ul style="list-style-type: none"> Overall 1 & 1 (AM)&(PM) EB=12, NB=<1 (AM) EB=13, NB=1 (PM) 	<ul style="list-style-type: none"> Overall 1 & 1 (AM)&(PM) EB=12, NB=<1 (AM) EB=13, NB=1 (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB=1, NB=<1 (AM) EB=1, NB=1 (PM) 	<ul style="list-style-type: none"> EB=1, NB=<1 (AM) EB=1, NB=1 (PM) 	<ul style="list-style-type: none"> EB=1, NB=<1 (AM) EB=1, NB=1 (PM)
Geometrics & Safety			
Geometrics and Safety	<ul style="list-style-type: none"> A NB left-turn lane is warranted 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on right of centreline is preferred (as per Section E.9.1, GDSOH) 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on centreline reduces horizontal alignment deflection
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Impact to 3 driveways 	<ul style="list-style-type: none"> Minor impact to 3 driveways
Constructability			
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction
Cost			
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$194,000 Utilities \$17,000 Property \$0 Total \$211,000 	<ul style="list-style-type: none"> Construction \$314,000 Utilities \$0 Property \$0 Total \$314,000

Social & Cultural Environment

	Do Nothing	F1	F2
Business & Property			
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 		
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impact for future development 		
Noise			
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 		
Land Use			
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 		
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the study area 		
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 	<ul style="list-style-type: none"> R. Archambault & Son Iron Works (5185 Highway 138, St. Andrews West) 	<ul style="list-style-type: none"> R. Archambault & Son Iron Works (5185 Highway 138, St. Andrews West)
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> immediately adjacent to improvements, but not impacted 	<ul style="list-style-type: none"> immediately adjacent to improvements, but not impacted
Built & Cultural Heritage			
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> There are no registered built heritage or cultural features in the study area 		
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 		
Archaeology			
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 		

Natural Environment

	Do Nothing	F1	F2
Terrestrial Ecosystem			
Unevaluated Wetlands	<ul style="list-style-type: none"> No impact to unevaluated wetlands 		
Impact to Significant Trees	<ul style="list-style-type: none"> No removal of significant trees is required 		
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 		
Fish & Fish Habitat			
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossing required 		
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 		
Species of Conservation Concern			
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 		
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified are within the study area 		
Environmentally Sensitive Areas, Designated Areas			
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 		
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 		

Alternative – Do Nothing

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	2	1	33%	9.3%
		Geometrics & Safety	15.5%	0	2	1	33%	5.2%
		Constructability	2.0%	0	1	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	2	0	0	100%	3.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	2	14	2		44.3%

Alternative G1– Northbound left-turn lane on Highway 138 with widening east of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	2	1	1	63%	9.7%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	3	10	5		44.9%

Alternative G2 – Northbound left-turn lane on Highway 138 with widening on both sides of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	1	1	0	75%	21.0%
		Geometrics & Safety	15.5%	1	2	1	50%	7.8%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	2	10	6		43.0%

Alternative G3 – Northbound and southbound left-turn lanes on Highway 138 with widening on both sides of the centreline

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	2	1	0	83%	23.3%
		Geometrics & Safety	15.5%	2	2	1	60%	9.3%
		Constructability	2.0%	0	0	1	0%	0.0%
		Cost	7.5%	0	0	1	0%	0.0%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	1	0	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	1	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	4	10	6		46.9%

Highway Engineering

	Do Nothing	G1	G2	G3
Traffic Operations				
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Overall 2 & 2 (AM)&(PM) EB=13, WB=16, NB=1, SB=<1, (AM) EB=15, WB=21, NB=1, SB=<1, (PM) 	<ul style="list-style-type: none"> Overall 2 & 1 (AM) &(PM) EB=13, WB=16, NB=1, SB=<1, (AM) EB=15, WB=21, NB=1, SB=<1, (PM) 	<ul style="list-style-type: none"> Overall 2 & 1 (AM) &(PM) EB=13, WB=16, NB=1, SB=<1, (AM) EB=15, WB=21, NB=1, SB=<1, (PM) 	<ul style="list-style-type: none"> Overall 2 & 1 (AM) &(PM) EB=13, WB=16, NB=1, SB=<1, (AM) EB=15, WB=21, NB=1, SB=<1, (PM)
Traffic Queue Length (m)	<ul style="list-style-type: none"> EB=2, WB=2, NB=<1, SB=<1 (AM) EB=3, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=2, WB=2, NB=<1, SB=<1 (AM) EB=3, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=2, WB=2, NB=<1, SB=<1 (AM) EB=3, WB=2, NB=1, SB=<1 (PM) 	<ul style="list-style-type: none"> EB=2, WB=2, NB=<1, SB=<1 (AM) EB=3, WB=2, NB=1, SB=<1 (PM)
Geometrics & Safety				
Geometrics and Safety	<ul style="list-style-type: none"> A NB left-turn lane is warranted 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on right of centreline is preferred when an opposing left-turn lane is not warranted (Section E.9.1, GDSOH) 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane LTL constructed on centreline reduces horizontal alignment deflection 	<ul style="list-style-type: none"> Provides warranted NB left-turn lane Provides opposing SB left-turn lane LTL constructed on centreline reduces horizontal alignment deflection, and provides for a better opportunity to provide the opposing left-turn lane at a cross intersection
Impacts to Driveways (Intersections)	<ul style="list-style-type: none"> No impacts 	<ul style="list-style-type: none"> Minor impact to 3 driveways 	<ul style="list-style-type: none"> Minor impact to 3 driveways 	<ul style="list-style-type: none"> Minor impact to 3 driveways
Constructability				
Construction Feasibility	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Can be constructed using conventional construction techniques
Traffic Impacts During Construction	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction 	<ul style="list-style-type: none"> Moderate impacts to traffic during construction
Cost				
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> No cost 	<ul style="list-style-type: none"> Construction \$279,000 Utilities \$21,000 Property \$3,000 Total \$303,000 	<ul style="list-style-type: none"> Construction \$388,000 Utilities \$38,500 Property \$1,500 Total \$428,000 	<ul style="list-style-type: none"> Construction \$429,000 Utilities \$38,500 Property \$1,500 Total \$469,000

Social & Cultural Environment

	Do Nothing	G1	G2	G3
Business & Property				
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> Requires purchase of 0.03 ha of land from 1 property 	<ul style="list-style-type: none"> Requires purchase of 0.01 ha of land from 1 property 	<ul style="list-style-type: none"> Requires purchase of 0.01 ha of land from 1 property
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> No impact to potential future development 			
Noise				
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	<ul style="list-style-type: none"> The proposed minor improvements will not affect noise conditions at adjacent NSRs 			
Land Use				
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> No impacts to snowmobile crossing 			
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland in the study area 			
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves within the study area 			
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> There is no contaminated property within the study area 			
Built & Cultural Heritage				
Impact to Registered Built Heritage / Cultural Feature	<ul style="list-style-type: none"> No impact 	<ul style="list-style-type: none"> Impacts cultural/built heritage features (farm complex cultural heritage landscape) 		
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	<ul style="list-style-type: none"> N/A 			
Archaeology				
Impact to Registered Archaeological Sites	<ul style="list-style-type: none"> There are no registered archaeological sites in the study area 			

Natural Environment

	Do Nothing	G1	G2	G3
Terrestrial Ecosystem				
Unevaluated Wetlands	<ul style="list-style-type: none"> There are no unevaluated wetlands in the study area 			
Impact to Significant Trees	<ul style="list-style-type: none"> There are no significant trees impacted 			
Area of Vegetation Removal	<ul style="list-style-type: none"> No vegetation removal is required 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 10 m²) 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 20 m²) 	<ul style="list-style-type: none"> Minor vegetation removal of roadside vegetation (approximately 20 m²)
Fish & Fish Habitat				
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings / extensions required 	<ul style="list-style-type: none"> Requires extension of one crossing of an unnamed tributary that provides fish habitat (Crossing ID 17) 	<ul style="list-style-type: none"> Requires extension of one crossing of an unnamed tributary that provides fish habitat (Crossing ID 17) 	<ul style="list-style-type: none"> Requires extension of one crossing of an unnamed tributary that provides fish habitat (Crossing ID 17)
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> No impact to fish or fish habitat 	<ul style="list-style-type: none"> Approximately 25 m² 	<ul style="list-style-type: none"> Approximately 25 m² 	<ul style="list-style-type: none"> Approximately 25 m²
Species of Conservation Concern				
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 			
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species habitat was identified within the study area 			
Environmentally Sensitive Areas, Designated Areas				
Impact to Newington Bog	<ul style="list-style-type: none"> N/A 			
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> There are no Sourcewater Protection Areas within the study area 			

EVALUATION SCORING – Passing Lane Alternative Evaluation
 Passing Lanes

Passing Lane NB-1 Headline Road to County road 43

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	3	1	0	88%	24.5%
		Geometrics & Safety	15.5%	3	1	0	88%	13.6%
		Constructability	2.0%	0	2	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	3	0	50%	1.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	1	1	1	50%	1.5%
		Fish & Fish Habitat	3.0%	0	0	3	0%	0.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	2	0	50%	3.5%
Totals	100%		100.0%	7	17	4		57.1%

Passing Lane SB-1 – Headline Road to County Road 43

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	3	1	0	88%	24.5%
		Geometrics & Safety	15.5%	4	1	0	90%	14.0%
		Constructability	2.0%	0	2	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	2	1	33%	0.7%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	1	0	2	33%	1.0%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	1	25%	1.8%
Totals	100%		100.0%	8	13	7		54.9%

Passing Lane NB-2 County Road 43 to Highway 417

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	3	1	38%	10.5%
		Geometrics & Safety	15.5%	1	3	0	63%	9.7%
		Constructability	2.0%	0	2	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	0	3	0%	0.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	3	0%	0.0%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	2	0	50%	3.5%
Totals	100%		100.0%	1	16	10		36.7%

Passing Lane SB-2 County Road 43 to Highway 417

Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Traffic Operations	28.0%	0	3	1	38%	10.5%
		Geometrics & Safety	15.5%	1	3	0	63%	9.7%
		Constructability	2.0%	0	2	0	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	0	1	0%	0.0%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	0	1	2	17%	0.3%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	3	0%	0.0%
		Fish & Fish Habitat	3.0%	0	0	3	0%	0.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	2	0	50%	3.5%
Totals	100%		100.0%	1	17	10		37.0%

EVALUATION DATA – Passing Lane Alternative Evaluation

Passing Lanes

Highway Engineering

	NB-1	SB-1	NB-2	SB-2
Traffic Operations				
Traffic Delay (sec/veh)	<ul style="list-style-type: none"> Improves LOS from D to C (*) Lowers % Time Spent Following from existing (*) Decreases Total Travel Time from existing (*) Required APO is 21.7%, Available APO is 19.5% 	<ul style="list-style-type: none"> Improves LOS from D to C (*) Lowers % Time Spent Following from existing (*) Decreases Total Travel Time from existing (*) Required APO is 20.2%, Available APO is 18.3% 	<ul style="list-style-type: none"> Improves LOS from C to B (*) Lowers % Time Spent Following from existing (*) Does not decrease Total Travel Time from existing (*) Required APO is 18.0%, Available APO is 29.2% 	<ul style="list-style-type: none"> Improves LOS from C to B (*) Lowers % Time Spent Following from existing (*) Does not decrease Total Travel Time from existing (*) Required APO is 16.3%, Available APO is 27.3%
* Source: Highway 138 Corridor Traffic Operations and Safety Review, January, 2014, IBI Group				
Traffic Queue Length (m)	N/A	N/A	N/A	N/A
Geometrics & Safety				
Geometrics and Safety	<ul style="list-style-type: none"> Absolute Collision Reduction 0.53 (*) Economic Collision Savings \$26,273 (*) Passing lane located in a desirable area with a long vertical crest curve A NB passing lane is warranted by 2019 under low traffic growth in this highway section 	<ul style="list-style-type: none"> Absolute Collision Reduction 0.47 (*) Economic Collision Savings \$34,943 (*) Passing lane located in a desirable area with a long vertical crest curve Start of passing lane is just south of a signalized intersection (this will help with reduced speeds from large trucks starting from a stopped position) A SB passing lane is warranted by 2019 under low traffic growth in this highway section 	<ul style="list-style-type: none"> Absolute Collision Reduction 0.40 (*) Economic Collision Savings \$21,264 (*) Passing lane located in a desirable area with a long vertical crest curve A NB passing lane is not warranted by 2039 under high traffic growth in this highway section 	<ul style="list-style-type: none"> Absolute Collision Reduction 0.39 (*) Economic Collision Savings \$17,580 (*) Passing lane located in a desirable area with an upgrade for the entire length and a long vertical crest curve A SB passing lane is not warranted by 2039 under high traffic growth in this highway section
* Source: Highway 138 Corridor Traffic Operations and Safety Review, January, 2014, IBI Group				
Frequency & Location of Intersections & Entrances	<ul style="list-style-type: none"> 1 T-intersection 10 Entrances (6 residential, 2 field, 1 cell tower, and 1 Gun Club) 	<ul style="list-style-type: none"> 2 T-intersections 14 Entrances (7 residential, 5 field, and 2 farm) 	<ul style="list-style-type: none"> 1 T-intersection 9 Entrances (2 residential, and 7 field) 	<ul style="list-style-type: none"> 1 T-intersection 11 Entrances (1 residential, and 10 field)
Constructability				
Construction Feasibility	Can be constructed using conventional construction techniques			
Traffic Impacts During Construction	Moderate impacts to traffic during construction			
Cost				
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> \$ Construction \$1,472,000 Utilities \$328,000 Property \$18,000 Total \$1,818,000 	<ul style="list-style-type: none"> Construction \$1,668,000 Utilities \$34,000 Property \$18,000 Total \$1,720,000 	<ul style="list-style-type: none"> Construction \$1,500,000 Utilities \$0 Property \$31,000 Total \$1,531,000 	<ul style="list-style-type: none"> Construction \$1,404,000 Utilities \$0 Property \$14,000 Total \$1,418,000

Social & Cultural Environment

	NB-1	SB-1	NB-2	SB-2
Business & Property				
Number & Area of Private Property Impacts	Requires purchase of 0.84 ha of land from 3 properties	Requires purchase of 0.35 ha of land from 5 properties	Requires purchase of 0.64 ha of land from 5 properties	Requires purchase of 0.29 ha of land from 4 properties
Impact to Area Identified for Future Development	No impact to potential future development	No impact to potential future development	No impact to potential future development	No impact to potential future development
Noise				
Noise Increase (≥65 dBA or an Increase of ≥5 dBA to NSAs)	Minimal potential for noise impacts to 4 NSRs within 600 metres	Minimal potential for noise impacts to 4 NSRs within 600 metres	Minimal potential for noise impacts to 1 NSR within 600 metres	Minimal potential for noise impacts to 2 NSRs within 600 metres
Land Use				
Accommodates Existing Snowmobile Crossings	Requires an additional lane crossing for OFSC trail SV10	There are no snowmobile crossings within the study area	Requires an additional lane crossing for OFSC trail A213	Requires an additional lane crossing for OFSC trail Valleys Corners trail
Impact to Active Farmland	No impact to active farmland	Impacts approximately 2150 m ² of farmland	Impacts approximately 3875 m ² of farmland	Impacts approximately 1950 m ² of farmland
Impact to Aggregate and Mineral Reserves	There are no aggregate and mineral reserves within the study area	There are no aggregate and mineral reserves within the study area	Minor property requirements from 3 licenced aggregate extraction sites (Site IDs: 5892, 5926, and 5935)	There are no aggregate and mineral reserves within the study area
Impact to Potentially Contaminated Property	There is no potentially contaminated property within the study area	There is no potentially contaminated property within the study area	There is no potentially contaminated property within the study area	There is no potentially contaminated property within the study area
Built & Cultural Heritage				
Impact to Registered Built Heritage / Cultural Feature	Impacts cultural/built heritage features (farm complex cultural heritage landscape)	Minor property requirements from CHL 10, at remnant farm complex identified as a cultural heritage landscape	There are no cultural/built heritage features within the study area	There are no cultural/built heritage features within the study area
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)	N/A			
Archaeology				
Impact to Registered Archaeological Sites	There are no registered archaeological sites in the study area			

EVALUATION DATA – Passing Lane Alternative Evaluation Passing Lanes

Natural Environment	NB-1	SB-1	NB-2	SB-2
Terrestrial Ecosystem				
Unevaluated Wetlands	<ul style="list-style-type: none"> No unevaluated wetlands impacted 	<ul style="list-style-type: none"> No unevaluated wetlands impacted 	<ul style="list-style-type: none"> Approximately 1020 m² of unevaluated wetland impacted 	<ul style="list-style-type: none"> Approximately 200 m² of unevaluated wetland impacted
Impact to Significant Trees	<ul style="list-style-type: none"> No impact to significant trees 			
Area of Vegetation Removal	<ul style="list-style-type: none"> Approximately 65 m² of vegetation to be removed 	<ul style="list-style-type: none"> Approximately 1390 m² of vegetation to be removed 	<ul style="list-style-type: none"> Approximately 1540 m² of vegetation to be removed 	<ul style="list-style-type: none"> Approximately 1770 m² of vegetation to be removed
Fish & Fish Habitat				
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> Requires three culvert extensions (two Unnamed Drains and McDonald Creek Drain Unnamed Tributary 1) 	<ul style="list-style-type: none"> Requires one culvert extension (North Raisin River Tributary / McIntosh Branch Drain) 	<ul style="list-style-type: none"> Requires one culvert extension (Payne River Tributary / Montgomery Drain) 	<ul style="list-style-type: none"> Requires one culvert extension (Moose Creek Tributary / Fraser Municipal Drain)
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> Approximately 70 m² 	<ul style="list-style-type: none"> Approximately 15 m² 	<ul style="list-style-type: none"> Approximately 20 m² 	<ul style="list-style-type: none"> Approximately 15 m²
Species of Conservation Concern				
Impact to Rare Species	<ul style="list-style-type: none"> Impacts property with potential habitat for Snapping turtle and Blanding's turtle 	<ul style="list-style-type: none"> Impacts property with potential habitat for Barn Swallow, Bobolink, Butternut, Eastern Meadowlark, Yellow Rail 	<ul style="list-style-type: none"> Impacts property with potential habitat for Barn Swallow, Bobolink, Eastern Meadowlark, and turtles 	<ul style="list-style-type: none"> Impacts property with potential habitat for Eastern Meadowlark, and Bobolink
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> Potential turtle overwintering habitat 	<ul style="list-style-type: none"> Deeryard (SWH), significant woodland, Newington Bog PSW 	<ul style="list-style-type: none"> Potential turtle overwintering habitat and potential turtle nesting habitat 	<ul style="list-style-type: none"> Habitat suitable for Eastern Meadowlark and Bobolink
Environmentally Sensitive Areas, Designated Areas				
Impact to Newington Bog	<ul style="list-style-type: none"> No impact to Newington Bog 	<ul style="list-style-type: none"> 1765 m² of Newington Bog 	<ul style="list-style-type: none"> No impact to Newington Bog 	<ul style="list-style-type: none"> No impact to Newington Bog
Impact to Sourcewater Protection Areas	<ul style="list-style-type: none"> No impacts to Sourcewater Protection Areas within the study area 	<ul style="list-style-type: none"> No impacts to Sourcewater Protection Areas within the study area 	<ul style="list-style-type: none"> Impacts approximately 6975 m² of WHPA D - this area does not have concerns identified with highway design 	<ul style="list-style-type: none"> No impacts to Sourcewater Protection Areas within the study area

EVALUATION SCORING – Carpool Lot Alternative Evaluation
Carpool Lots

Carpool Lot 1 - North side of Cornwall Centre Road just east of Brookdale Ave								
Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Site Location	28.0%	1	0	0	100%	28.0%
		Geometrics & Safety	15.5%	2	0	0	100%	15.5%
		Site Characteristics	2.0%	3	0	0	100%	2.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	1	0	0	100%	2.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	1	0%	0.0%
		Fish & Fish Habitat	3.0%	2	0	0	100%	3.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	9	8	1		73.8%

Carpool Lot 2 – East side of Highway 138, approximately 1.0 km north of Dundas Street (St. Andrews)								
Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Site Location	28.0%	1	0	1	50%	14.0%
		Geometrics & Safety	15.5%	1	1	0	75%	11.6%
		Site Characteristics	2.0%	3	0	0	100%	2.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	1	0	0	100%	2.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	1	0%	0.0%
		Fish & Fish Habitat	3.0%	2	0	0	100%	3.0%
		Species of Conservation Concern	7.5%	0	2	0	50%	3.8%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	8	9	2		55.9%

Carpool Lot 3 – East side of Highway 138, approximately 200 m north of County Road 43 (Monkland)								
Evaluation Category	Category Weight	Evaluation Criteria	Criteria Weight	Positive Count	Neutral Count	Negative Count	Raw Score	Weighted Score
Highway Engineering	53%	Site Location	28.0%	1	0	1	50%	14.0%
		Geometrics & Safety	15.5%	2	0	0	100%	15.5%
		Site Characteristics	2.0%	2	0	2	50%	1.0%
		Cost	7.5%	0	1	0	50%	3.8%
Social & Cultural Environment	27%	Business & Property	15.5%	0	1	0	50%	7.8%
		Noise	2.0%	0	1	0	50%	1.0%
		Land Use	2.0%	1	0	0	100%	2.0%
		Built & Cultural Heritage	5.0%	0	1	0	50%	2.5%
		Archaeology	2.0%	0	1	0	50%	1.0%
Natural Environment	21%	Terrestrial Ecosystem	3.0%	0	0	1	0%	0.0%
		Fish & Fish Habitat	3.0%	0	0	2	0%	0.0%
		Species of Conservation Concern	7.5%	0	0	2	0%	0.0%
		Environmentally sensitive areas, designated areas	7.0%	0	1	0	50%	3.5%
Totals	100%		100.0%	6	6	8		52.0%

EVALUATION DATA – Carpool Lot Alternative Evaluation
Carpool Lots

Highway Engineering

	1	2	3
Proximity to Existing Parking	<ul style="list-style-type: none"> No existing parking near this location 	<ul style="list-style-type: none"> Approximately 1.0 km north of existing parking at St. Andrews 	<ul style="list-style-type: none"> Opposite existing parking at Tim Horton's parking lot at Monkland
Access to an Interchange	<ul style="list-style-type: none"> Close to Highway 401 (0.7 km) 	<ul style="list-style-type: none"> Approximately 7.0 km north of Highway 401 	<ul style="list-style-type: none"> Approximately 17.0 km south of Highway 417
Geometrics and Safety	<ul style="list-style-type: none"> Located on a horizontal tangent section of the highway alignment Located on very flat section of the vertical highway alignment 	<ul style="list-style-type: none"> Located on a horizontal tangent section of the highway alignment Located on fairly flat section, near the bottom of a 2% grade of the vertical highway alignment 	<ul style="list-style-type: none"> Located on a horizontal tangent section of the highway alignment Located on very flat section of the vertical highway alignment
Site topography	<ul style="list-style-type: none"> Site very flat, can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Site very flat, can be constructed using conventional construction techniques 	<ul style="list-style-type: none"> Site very flat, can be constructed using conventional construction techniques
Site Access	<ul style="list-style-type: none"> Good access opportunity 	<ul style="list-style-type: none"> Good access opportunity 	<ul style="list-style-type: none"> Access may conflict with County Road 43 turning lanes Access close to CP Railway (100 m south)
Proximity to Utility Services	<ul style="list-style-type: none"> Convenient utility services 	<ul style="list-style-type: none"> Convenient utility services 	<ul style="list-style-type: none"> Convenient utility services
Total Capital Cost (includes construction, utility relocation and property acquisition)	<ul style="list-style-type: none"> Cost similar to locations C2 & C3 	<ul style="list-style-type: none"> Cost similar to locations C1 & C3 	<ul style="list-style-type: none"> Cost similar to locations C1 & C2

Social & Cultural Environment

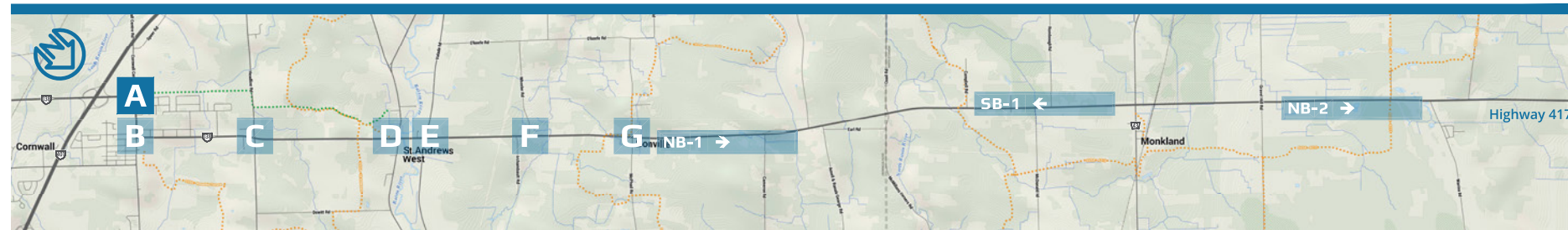
	1	2	3
Number & Area of Private Property Impacts	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> No property required 	<ul style="list-style-type: none"> No property required
Impact to Area Identified for Future Development	<ul style="list-style-type: none"> Minimal potential for noise impacts (approximately 201 NSRs within 600 metres) 	<ul style="list-style-type: none"> Minimal potential for noise impacts (approximately 34 NSRs) 	<ul style="list-style-type: none"> Minimal potential for noise impacts (approximately 39 NSRs)
Accommodates Existing Snowmobile Crossings	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 	<ul style="list-style-type: none"> There are no snowmobile crossings within the study area 	<ul style="list-style-type: none"> No impacts to snowmobile crossings
Impact to Active Farmland	<ul style="list-style-type: none"> There is no active farmland within the site 	<ul style="list-style-type: none"> There is no active farmland within the site 	<ul style="list-style-type: none"> There is no active farmland within the site
Impact to Aggregate and Mineral Reserves	<ul style="list-style-type: none"> There are no aggregate and mineral reserves in the study area 	<ul style="list-style-type: none"> There are no aggregate and mineral reserves in the study area 	<ul style="list-style-type: none"> There are no aggregate and mineral reserves in the study area
Impact to Potentially Contaminated Property	<ul style="list-style-type: none"> No impact to contaminated property 	<ul style="list-style-type: none"> There is no contaminated property in the study area 	<ul style="list-style-type: none"> No impact to contaminated property
Impact to Registered Built Heritage / Cultural Feature			
Impact to Stone Wall at Pioneer Cemetery (St. Andrews West)			
Impact to Registered Archaeological Sites			

EVALUATION DATA – Carpool Lot Alternative Evaluation
Carpool Lots

Natural Environment			
	1	2	3
Unevaluated Wetlands			
Impact to Significant Trees			
Area of Vegetation Removal	<ul style="list-style-type: none"> Vegetation removal of graminoid meadow and roadside vegetation (approximately 4600 m²) 	<ul style="list-style-type: none"> Vegetation removal of Gray Dogwood Deciduous Thicket Type (approximately 5750 m²) 	<ul style="list-style-type: none"> Vegetation removal of Willow Mineral Deciduous Thicket Swamp Ecosite and Cattail Graminoid Mineral Meadow Marsh Type (approximately 4650 m²)
Number of New Culverts or Culvert Extensions over Fish Bearing Watercourses	<ul style="list-style-type: none"> No new crossings or extensions required 	<ul style="list-style-type: none"> No new crossings or extensions required 	<ul style="list-style-type: none"> Requires one new crossing of the Monkland Drain/McDonald
Area of Impact to Fish Habitat	<ul style="list-style-type: none"> 0 m² 	<ul style="list-style-type: none"> 0 m² 	<ul style="list-style-type: none"> Approximately 20 m²
Impact to Rare Species	<ul style="list-style-type: none"> No potential rare species are within the study area 	<ul style="list-style-type: none"> No potential rare species are within the study area 	<ul style="list-style-type: none"> Potential for snapping turtle, but no endangered / threatened species-at-risk
Impact to Potential Rare Species Habitat	<ul style="list-style-type: none"> No potential rare species are within the study area 	<ul style="list-style-type: none"> No potential rare species are within the study area 	<ul style="list-style-type: none"> Potential turtle habitat
Impact to Newington Bog			
Impact to Sourcewater Protection Areas			

Appendix B: Alternatives

A Brookdale Avenue

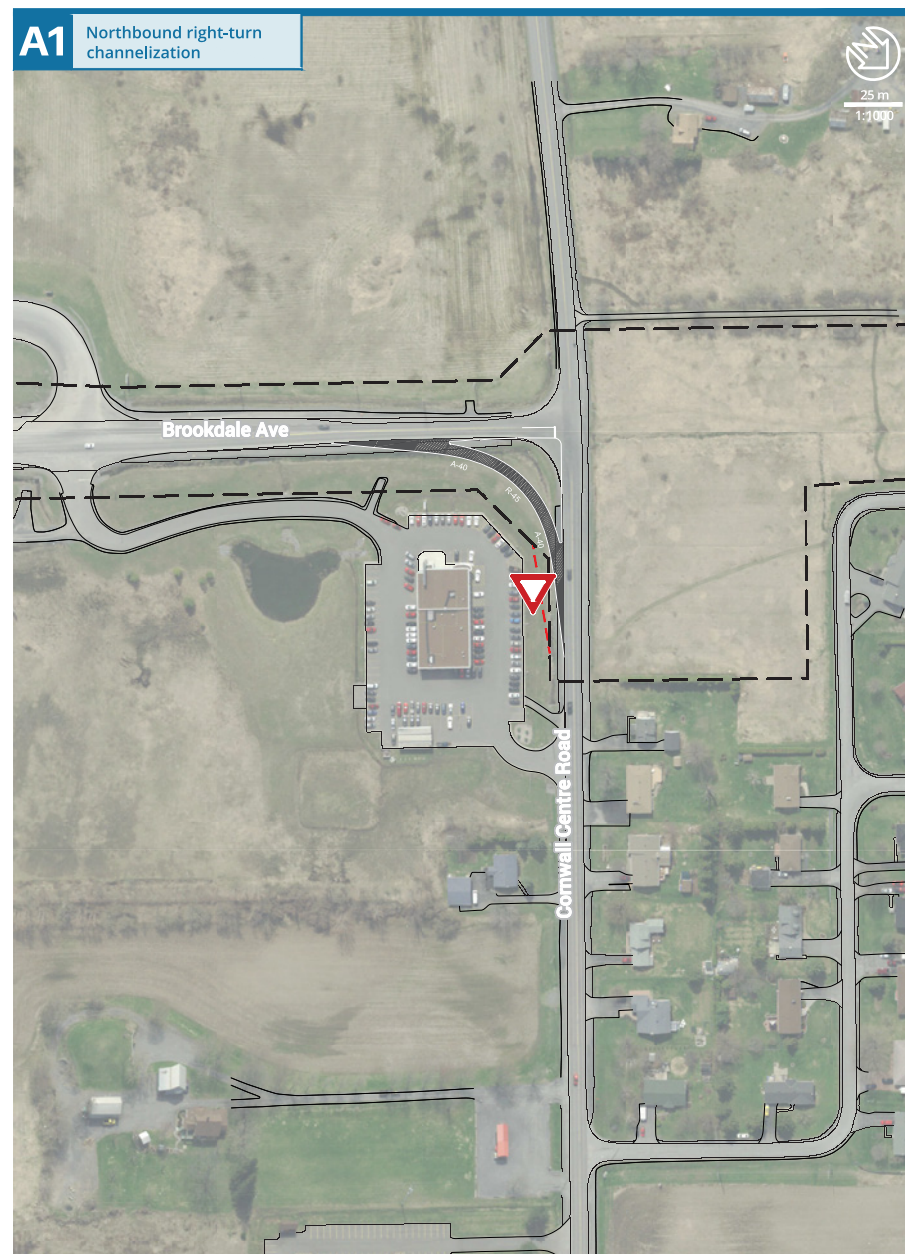


Assessment of the existing intersection

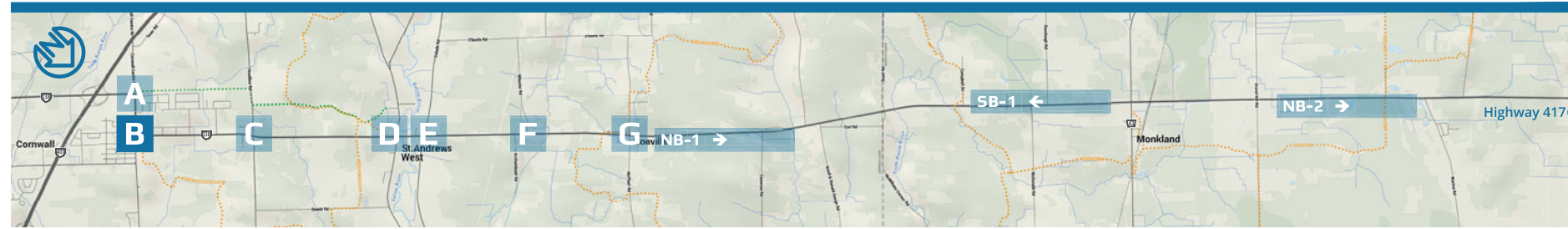
- ✓ Safety
- ✓ Traffic Operations
- ✓ Geometrics

- There is an opportunity to provide a more direct connection between Brookdale Ave and Cornwall Centre Rd, which is the predominant traffic movement

- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk

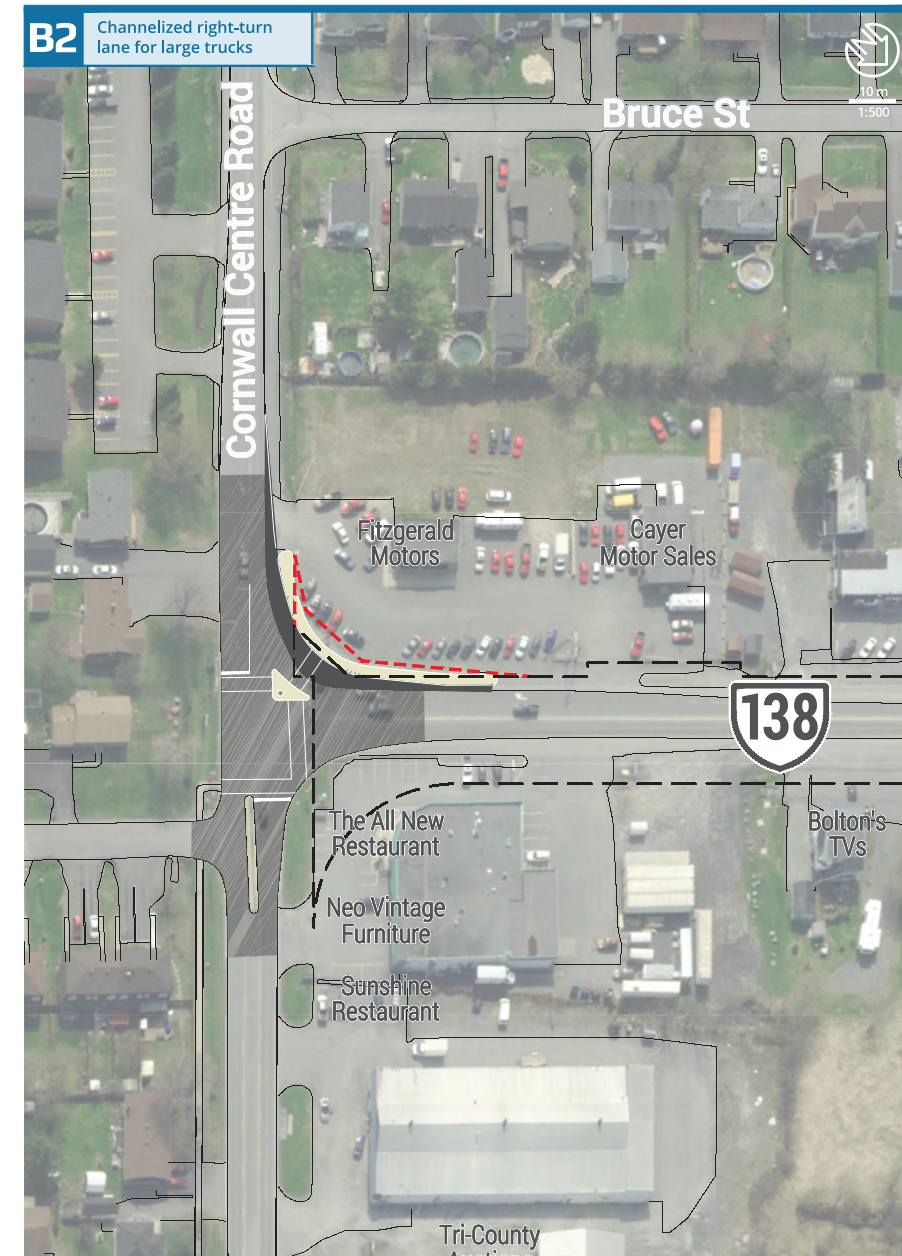
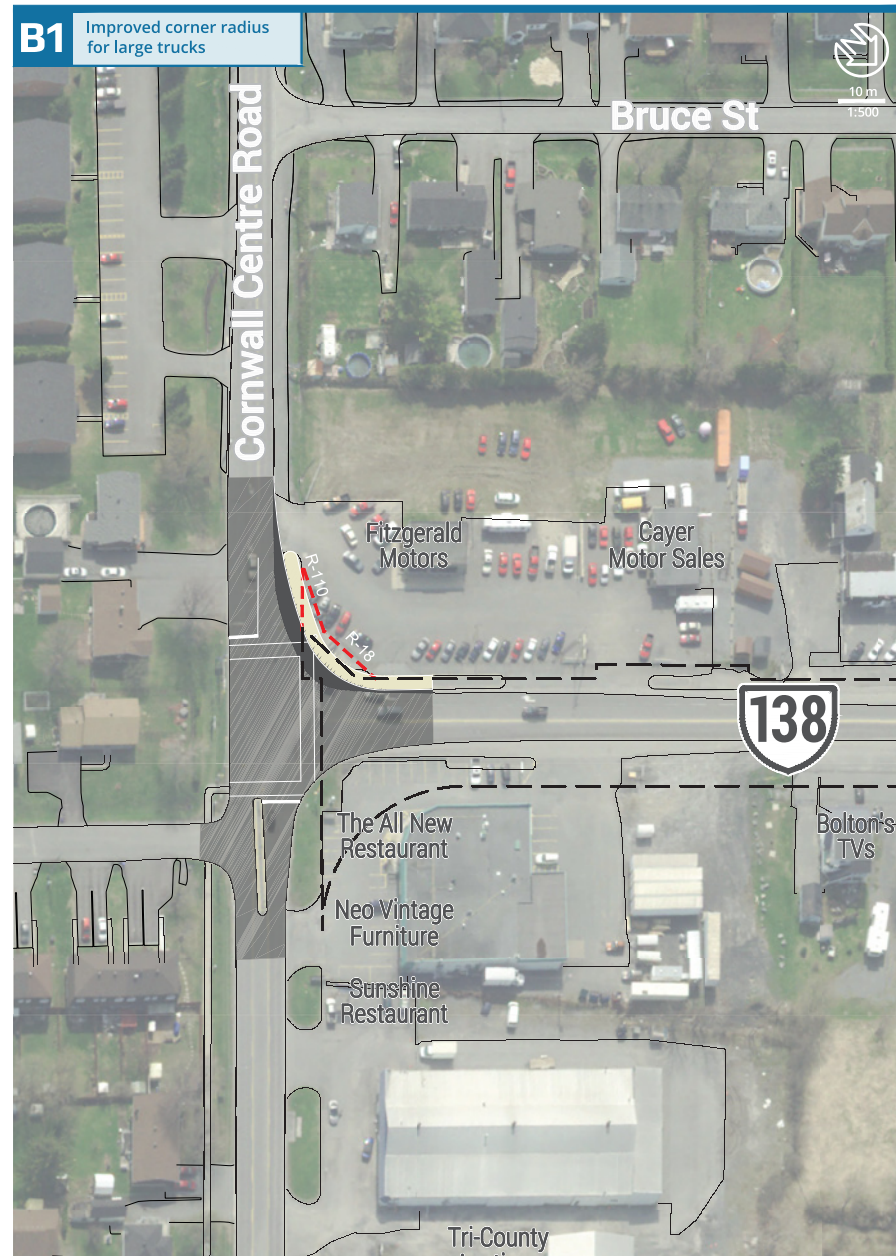


B Cornwall Centre Road

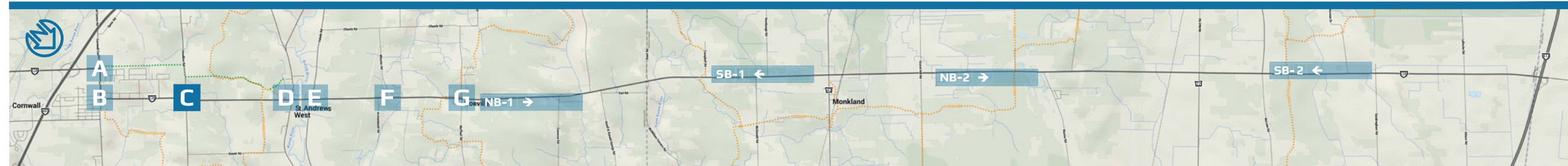


Assessment of the existing intersection

- ✔ Safety
 - ✔ Traffic Operations
 - ✘ Geometrics
- Large trucks have difficulty turning right on the southbound approach



C Headline Road



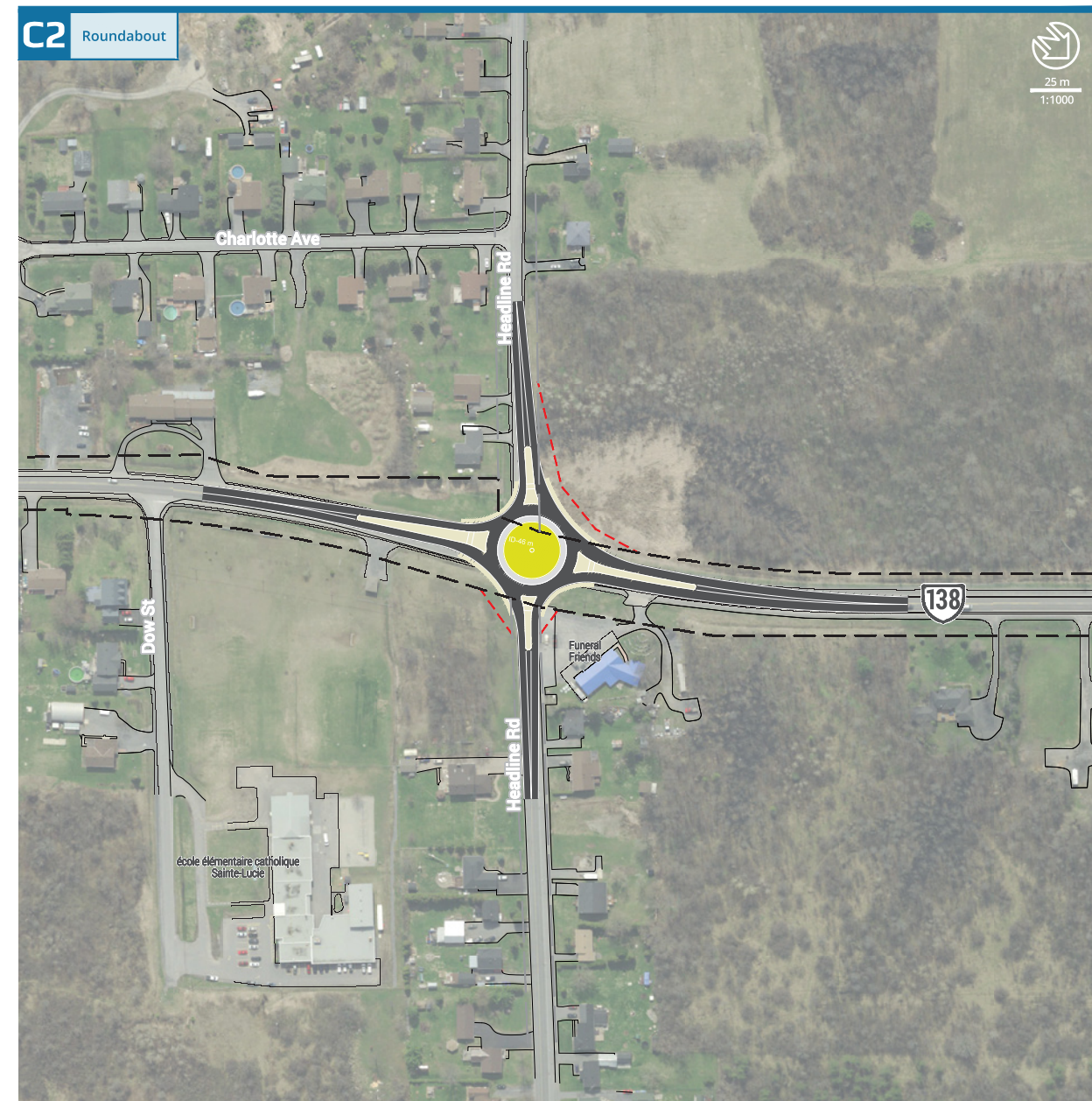
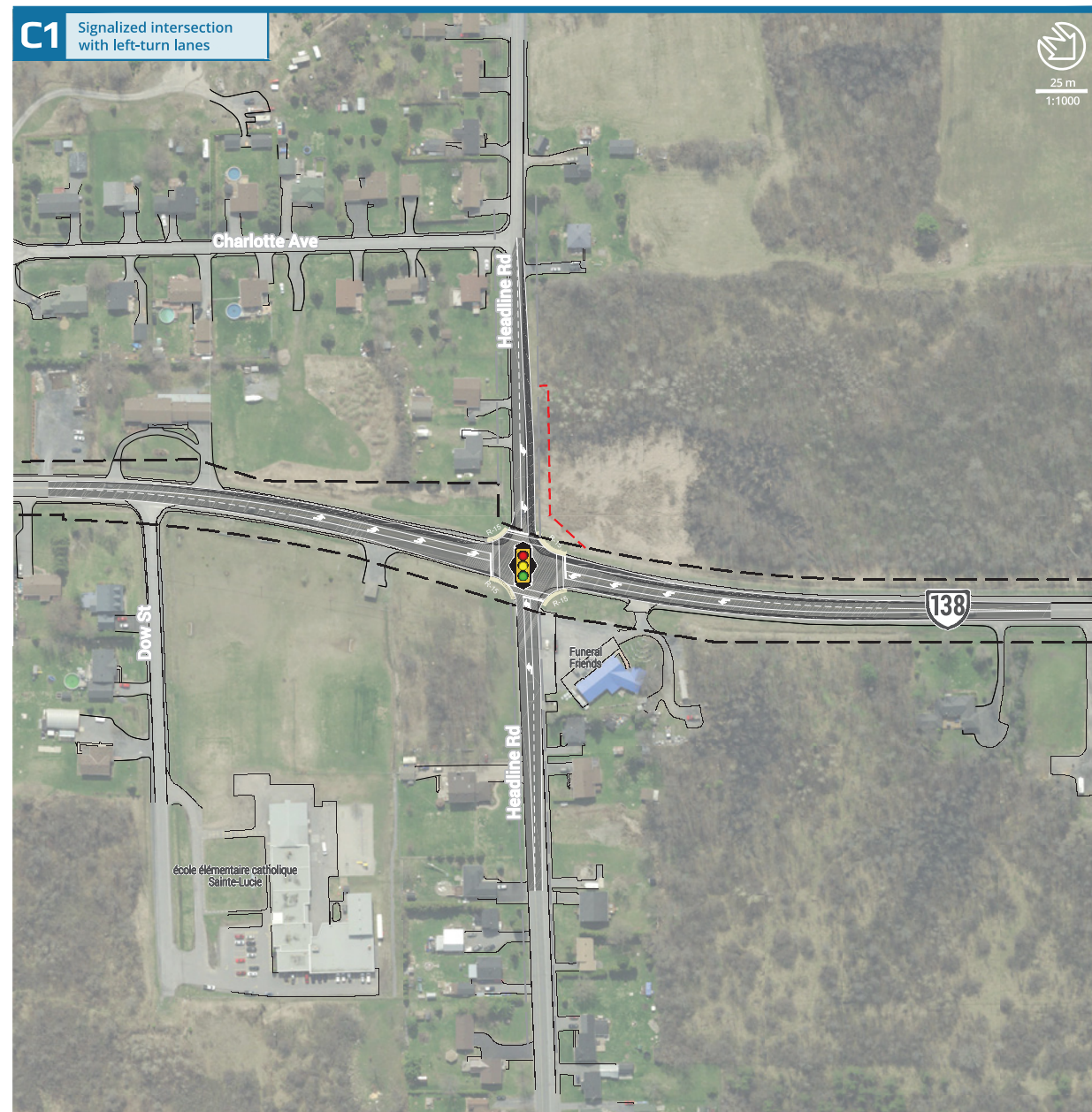
Assessment of the existing intersection

- **Safety**
 - **Traffic Operations**
 - **Geometrics**
- Traffic signals or a roundabout are proposed at this location
 - Left-turn lanes on Highway 138 are warranted

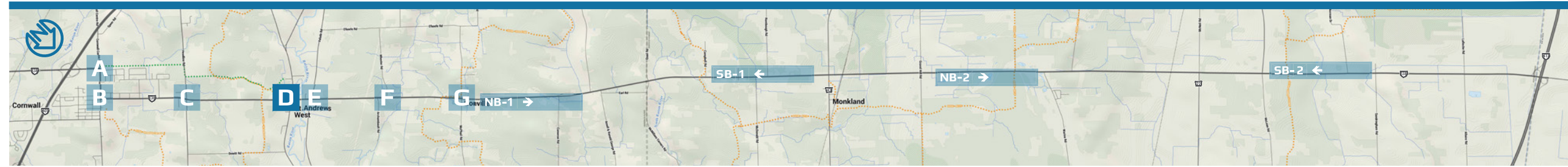
PEAK HOUR TRAFFIC VOLUMES

2012		2039 "Low Growth"	
AM	PM	AM	PM
35	14	40	15
66	20	75	25
64	19	75	20
1181	974	1350	1124
427	230	490	230
20	11	25	15
25	8	30	10
14	15	15	15
98		110	

- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk



Dundas St (County Rd 18)



Assessment of the existing intersection

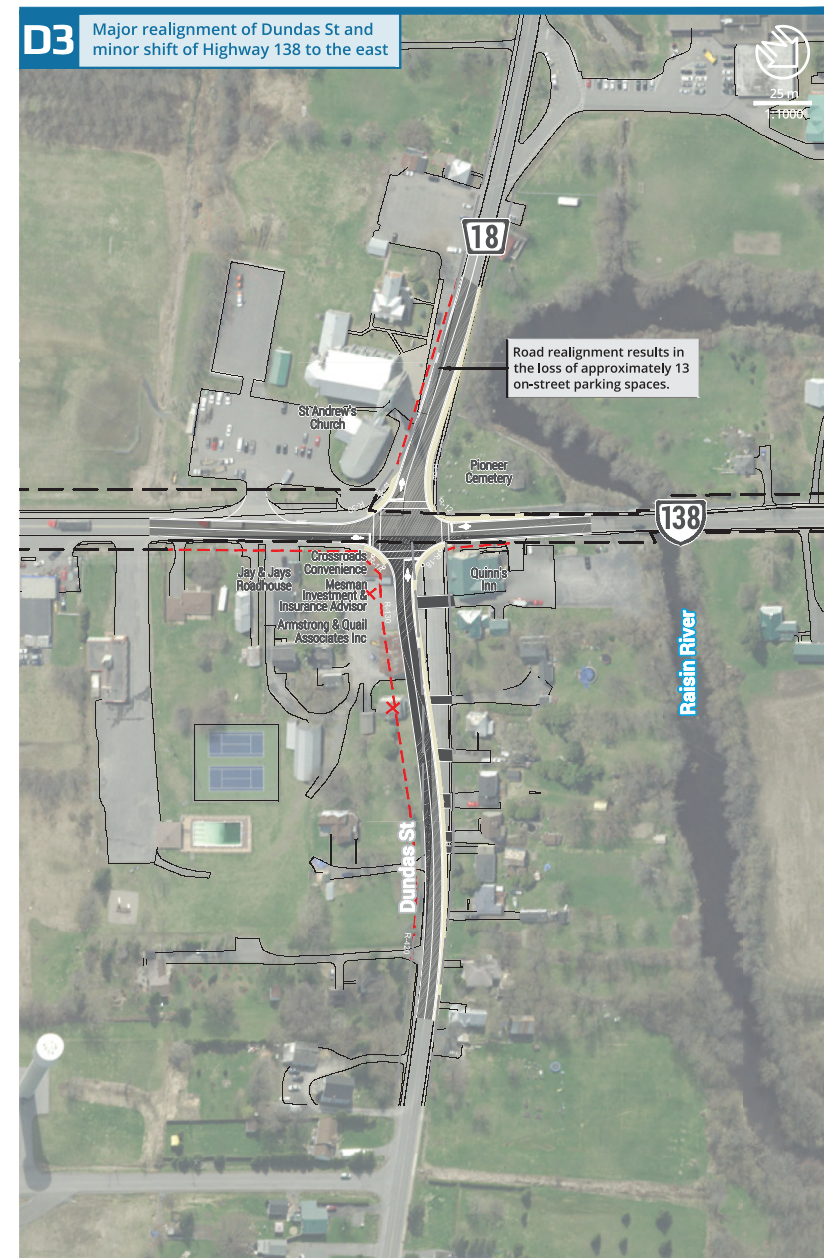
- ✔ Safety
- ✘ Traffic Operations
- ✔ Geometrics

- Large trucks have difficulty turning right on the southbound approach
- The alignment of Dundas Street through the intersection is poor

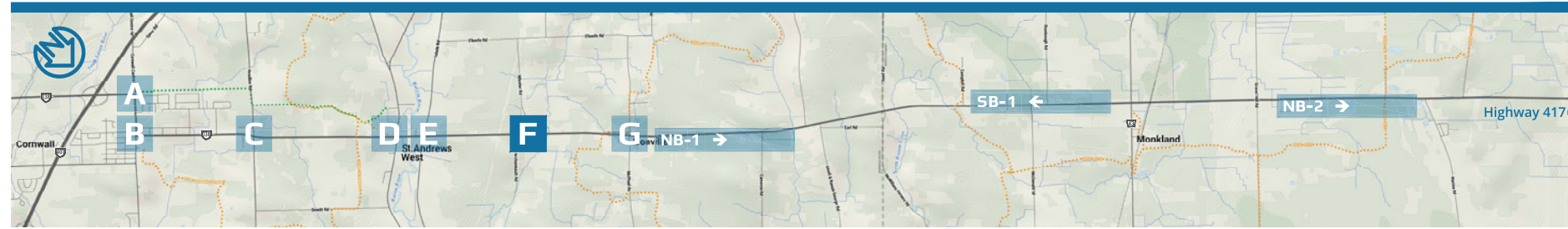
PEAK HOUR TRAFFIC VOLUMES

2012		2039 "Low Growth"	
AM	PM	AM	PM
45	35	50	40
32	25	35	30
1189	959	1340	1085
406	235	460	254
58	27	75	25
38	36	45	40
6		5	

- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk
- Property Acquisition



F Wheeler Road



Assessment of the existing intersection

- ✔ Safety
- ✔ Traffic Operations
- ✔ Geometrics

• A northbound left-turn-lane on Highway 138 is warranted at this location

PEAK HOUR TRAFFIC VOLUMES

2012				2039			
19	2	20	2	20	2	20	2
AM	PM	AM	PM	AM	PM	AM	PM
26	5	864	3	30	5	972	5
390	243	649	425	440	275	735	480

- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk

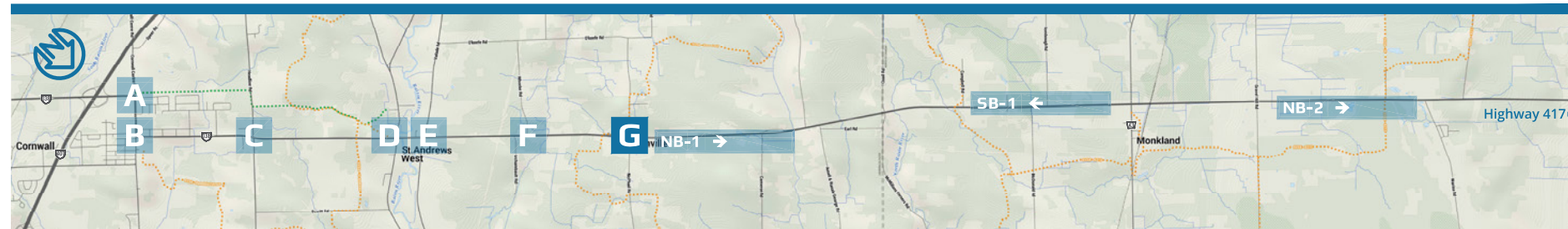
F1 Northbound left-turn lane on Highway 138 with widening east of the centerline



F2 Northbound left-turn lane on Highway 138 with widening on both sides of the centerline



G Myers Rd / McPhail Rd



Assessment of the existing intersection

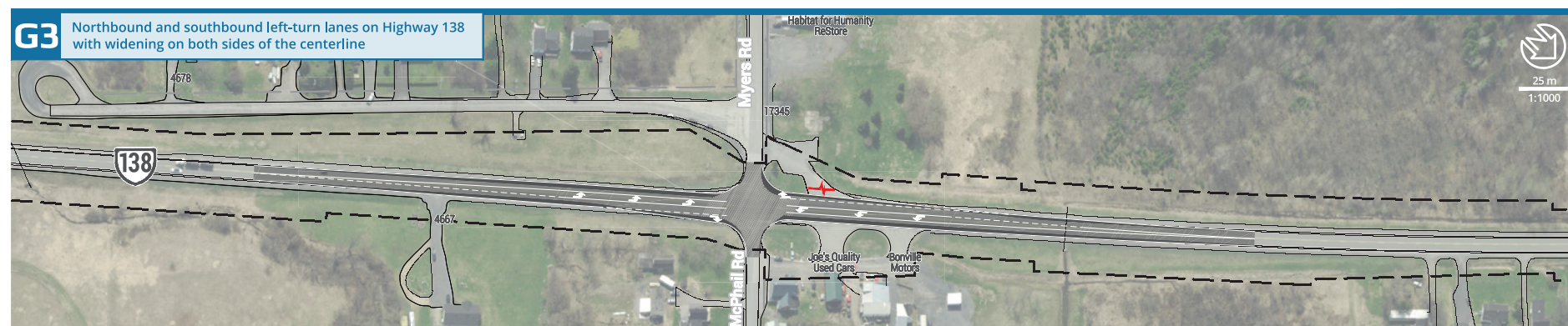
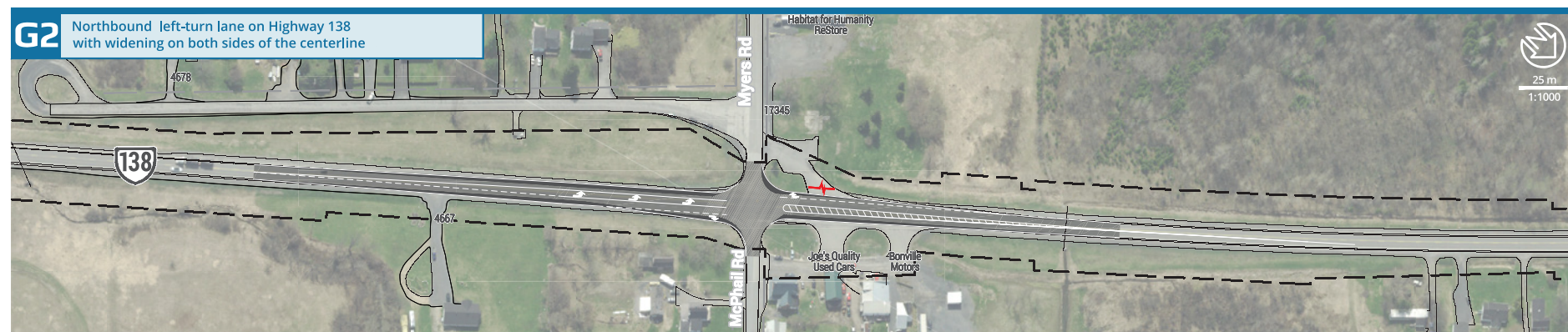
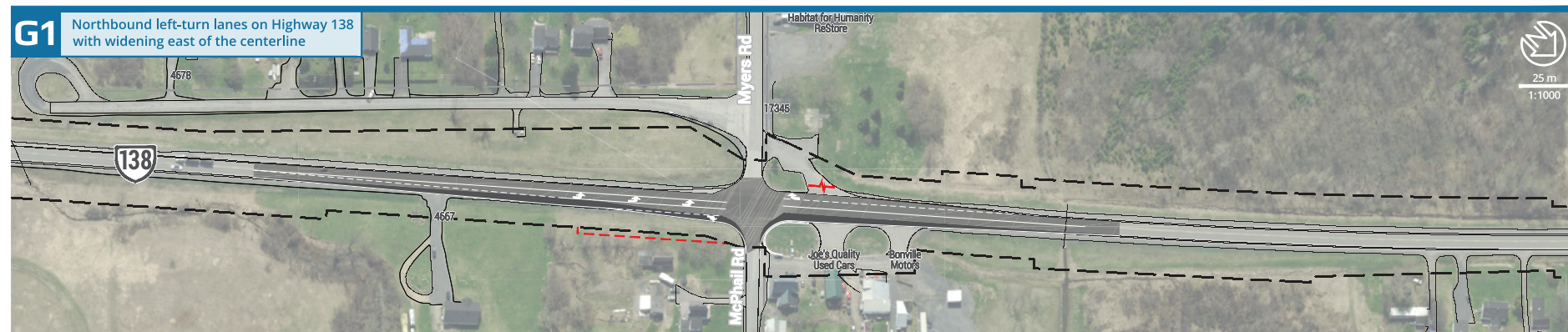
- ✓ Safety
- ✘ Traffic Operations
- ✓ Geometrics

• A northbound left-turn-lane on Highway 138 is warranted at this location

PEAK HOUR TRAFFIC VOLUMES

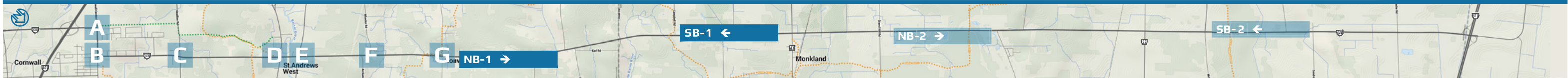
2012				2039			
AM	PM	AM	PM	AM	PM	AM	PM
22	18	25	10	30	15	35	10
32	17	35	10	40	15	45	10
27	13	30	8	35	10	40	8
343	225	324	401	385	255	401	365
12	5%	15	5%	15	5%	15	5%
11	3	10	5	10	5	10	5

- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk
- Entrance closure



PASSING LANE ALTERNATIVES

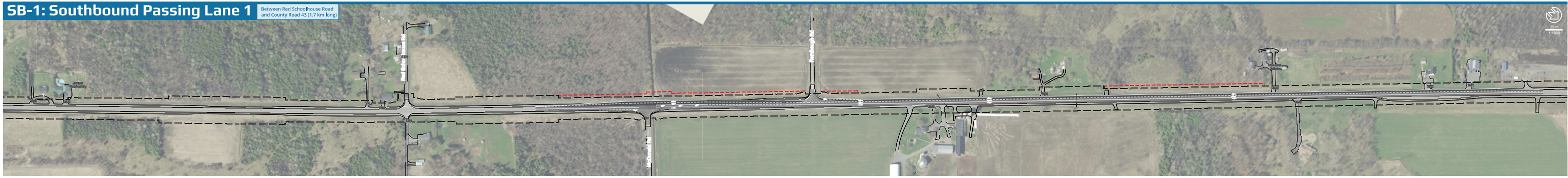
Headline Road to County Road 43



NB-1: Northbound Passing Lane 1 Between Myers Road and Guindon Road (2 km long)

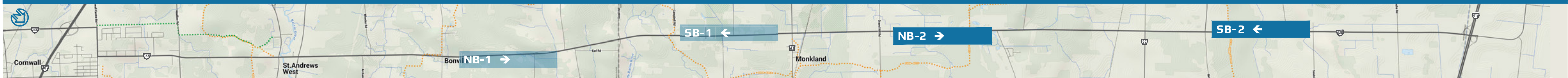


SB-1: Southbound Passing Lane 1 Between Red Schoolhouse Road and County Road 43 (1.7 km long)



PASSING LANE ALTERNATIVES

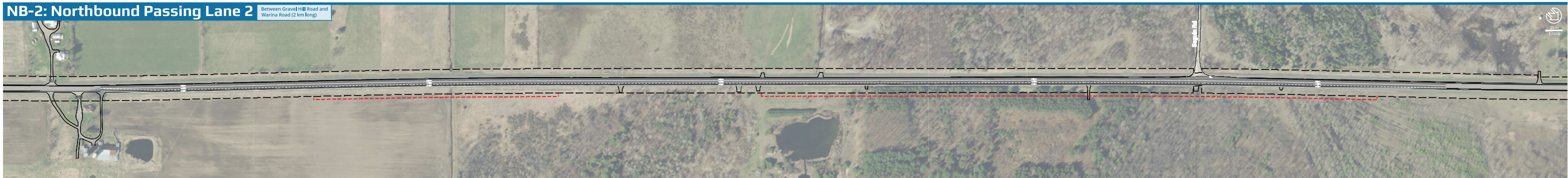
County Road 43 to Highway 417



- Existing right-of-way
- New right-of-way
- New roadway
- New sidewalk

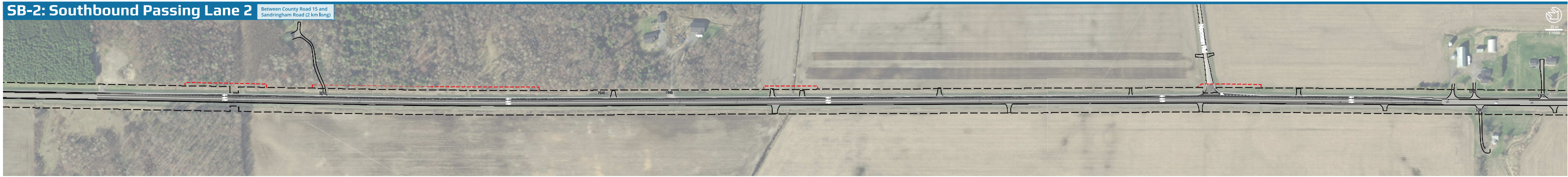
NB-2: Northbound Passing Lane 2

Between Gravel Hill Road and Warina Road (2 km long)



SB-2: Southbound Passing Lane 2

Between County Road 15 and Sandringham Road (2 km long)



P Possible carpool lot locations

The study area includes informal parking areas being used for carpooling; and parking for commuter bus lines that provide daily service between Cornwall and Ottawa.

As part of this study, the project team is completing a review of existing carpool and bus related parking along Highway 138 within the study limits.

The review includes:

- A review of existing parking locations and utilization
- An analysis of existing commuter bus routes and pick-up locations
- Consultation with municipalities, bus providers, stakeholders and commuters

A survey is available on the comment table.

Please take the time to complete this survey to assist the project team with identifying existing parking areas and confirming the need for public carpool parking.

Typical features of the possible carpool lots

- up to 30 parking spaces (with provision for future expansion)
- 1-2 accessible spaces
- 500-1500 m² site area to accommodate parking, landscaping, and drainage system
- gravel or asphalt parking surface
- illumination
- located on MTO property, where possible

P Emplacement possible des stationnements pour covoiturage

L'étude aborde les stationnements non officiels utilisés pour le covoiturage ainsi que le stationnement pour les lignes d'autobus servant les navetteurs qui voyagent quotidiennement entre Cornwall et Ottawa.

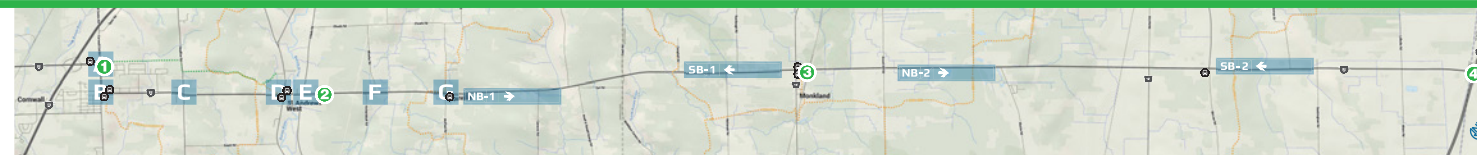
Dans le cadre de l'étude, l'équipe de projet effectue un examen des stationnements actuellement utilisés pour le covoiturage et par les utilisateurs d'autobus le long de la route 138, au sein du secteur à l'étude.

Cet examen comprend :

- une revue des stationnements actuels et de leur utilisation
- une analyse des lignes d'autobus servant les navetteurs et des points d'embarquement
- une consultation avec les municipalités, les exploitants de service d'autobus, les parties prenantes et les navetteurs

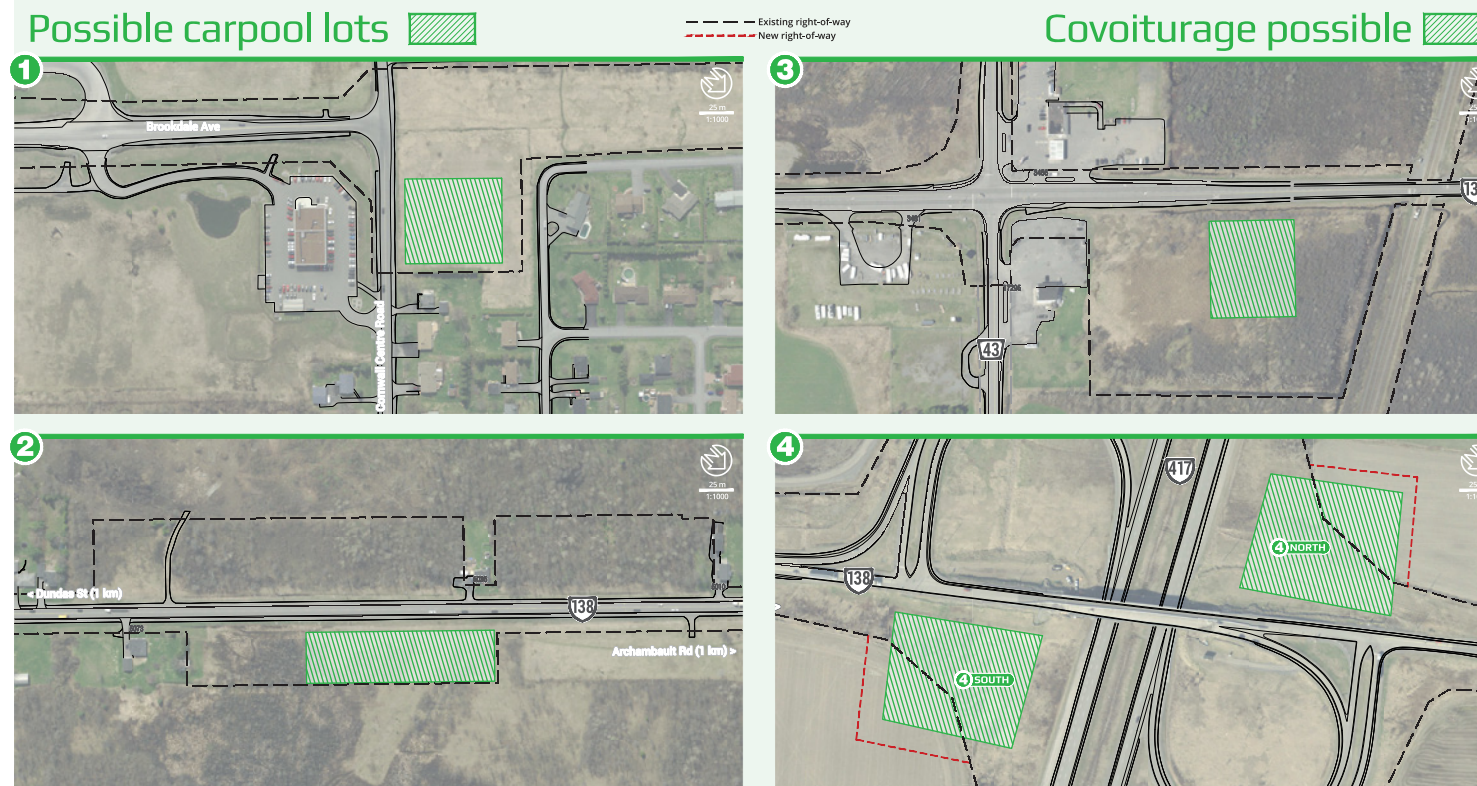
Un sondage est disponible sur la table des commentaires.

Veuillez prendre un moment pour y répondre. Vous aiderez ainsi l'équipe de projet à déterminer l'emplacement des zones de stationnement existantes et à confirmer le besoin d'aménager des stationnements publics pour covoiturage.



Existing bus stops (e) and possible carpool locations (P)

Arrêt d'autobus actuelles (e) et covoiturage possible (P)



Possible carpool lots

Covoiturage possible