



## Appendix I: DETAILED EVALUATION



Engineering  
for **people**

# MEMO

**TO** : Rory O’Sullivan (City of Mississauga)

**FROM** : Stephen Keen, David Hiatt (CIMA+)

**DATE** : June 24, 2022

**SUBJECT** : B1266 Clarkson Road and Lakeshore Road Intersections EA – Evaluation of Alternative Solutions

## 1. INTRODUCTION

The purpose of this memo is to summarize the assessment and evaluation of the alternative solutions and design concepts identified by the Clarkson Road and Lakeshore Road Intersections Environmental Assessment (EA), undertaken by the City of Mississauga.

The study investigated design concepts for the intersections of Clarkson Road North / Lakeshore Road and Clarkson Road South / Lakeshore Road.

## 2. EVALUATION OF ALTERNATIVE SOLUTIONS

Original concepts for the intersections included:

- Realignment of Clarkson Road North;
- Roundabout Intersection;
- Construction of a centre median on Lakeshore Road; and
- Prohibition of left turns.

Five (5) solutions were shortlisted for the intersections of Clarkson Road North / Lakeshore Road and Clarkson Road South / Lakeshore Road based on input from the public and progress of the technical studies:

- Do Nothing
- Solution 1 - Realign Clarkson Road North
- Solution 2 – Centre Median and Widen Lakeshore Road to provide adjacent left-turn lanes
- Solution 3 – Centre Median and Eastbound Left-turn via ‘Laneway’
- Solution 4 - Prohibit left turns at Clarkson Road South

The evaluation criteria and the detailed assessment and evaluation are provided in **Table 1**.

The ‘Do Nothing’ alternative was carried forward through the evaluation process for comparison purposes. This option is not recommended because it does not reasonably address the problems and opportunities identified in the study area, nor does it improve upon the existing conditions. Based on the traffic analysis completed for the study and the existing configuration of the intersections at

**B1266 Clarkson Road and Lakeshore Road Intersections EA – Evaluation of Alternative Solutions**











Lakeshore and Clarkson Road, significant congestion on Lakeshore Road will be experienced in the future horizon years of 2031 and 2041. As traffic increases, there will be congestion and queuing between intersections due to left-turn movements.

Solution 4 – Prohibit left turns at Clarkson Road South was carried forward through the evaluation process; however, the option was screened out prior to Public Information Centre #2 and therefore not presented at the public meeting. The screening occurred due to feedback received from key stakeholders following the completion of the evaluation and prior to PIC #2. The solution greatly reduced access to Clarkson Road South and this was deemed too impactful to local travel, businesses and residences to the south and accessibility, in particular to commercial businesses and the public school on Clarkson Road South. The impacts are exacerbated by the lack of other east-west roads, south of Lakeshore Road West, therefore requiring long detour routes. While not presented to the public, the option has been kept in the detailed evaluation table for documentation purposes.






Most Preferred	More Preferred	No Preference	Less preferred	Least Preferred

Table 1 Detailed Evaluation of the Alternative Solutions for the Clarkson Road and Lakeshore Road Intersections











Factor Area	Criteria (Measurement)	Short-listed Solutions				
		Do Nothing	Solution 1 – Realign Clarkson Road North	Solution 2 – Centre Median and Widen Lakeshore Road to provide adjacent left-turn lanes	Solution 3 – Centre Median and Eastbound Left-turn via ‘Laneway’	Solution 4 – Prohibit left-turns at Clarkson Road South
<b>Exhibit</b>						
<b>Description</b>		Maintain the existing configurations of the Clarkson Road North and South intersections on Lakeshore Road	Clarkson Rd. North realigned from Turtle Creek culvert, westerly to intersect with Clarkson Rd. South, forming a single intersection.	Lakeshore Rd. West is widened to accommodate adjacent left-turn lanes between intersections. Left-turn lanes delineated with a raised median.	Eastbound left-turn movement prohibited at Clarkson Rd North and relocated to Clarkson Rd South. Access to Clarkson Rd. North provided via a ‘laneway’.	Left-turn movements at Clarkson Rd. South are prohibited through the construction of a raised median spanning the intersections.
<b>Socio-Economic Environment</b>	Property Impacts (No. of private properties impacted)	Will not impact private properties.	Most property requirements - Three (3) private properties impacted, potentially requiring acquisition of all.	Lesser property requirements - One (1) private property impacted. Small area of property required.	Moderate property requirements - Three (3) private properties impacted, two (2) potentially requiring acquisition and a small area required from the third.	No impacts to private properties.
	Impact to existing businesses / schools / community facilities	No direct impacts to existing businesses, schools or community facilities; however, this solution does not provide an opportunity to improve access management on Lakeshore Road.	Most impacts - all three properties that are acquired are businesses, and improvements will restrict access to other businesses (i.e., right-in/ right-outs).	Lesser impacts – small amount of property required from gas station and minor access restrictions for businesses.	Moderate impacts – the two (2) properties acquired are businesses, and improvements will restrict access to businesses (i.e., right-in/ right-outs).	Moderate impacts – improvements restrict access to businesses (i.e., right-in/ right-outs), including significant out-of-way travel for businesses/residents located on Clarkson Road South. Improvements will likely require detouring of bus routes for the Clarkson Public School.
	Impact to existing stable neighbourhoods	Will not impact existing neighbourhood.	Disruptive to existing neighbourhood.	Improvements will not fundamentally change the existing neighbourhood.	Disruptive to existing neighbourhood.	Disruptive to existing neighbourhood.
	Noise and vibration impact to properties due to construction and operation	No construction required, therefore no noise and vibration impacts.	Greater construction required, potential for noise and vibration impacts to adjacent residential area.	Lesser construction required, thus least noise/vibration impacts.	Greater construction required, potential for noise and vibration impacts to adjacent residential area.	Lesser construction required, thus least noise/vibration impacts.
	Impacts to Air Quality	Queuing and idling on Lakeshore Road expected to increase in the future under the Do Nothing alternative.	Reduces queuing and idling on Lakeshore Road.	Reduces queuing and idling on Lakeshore Road.	Reduces queuing and idling on Lakeshore Road.	Reduces queuing and idling on Lakeshore Road from vehicles turning left onto Clarkson Road South, however, those vehicles will need to take longer routes to get to their destinations.

Factor Area	Criteria (Measurement)	Short-listed Solutions				
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	Provides Streetscape Amenities and Urban Design Improvement Opportunities. (Evaluate existing street tree zones and provide for a street tree corridor with furnishings unencumbered by below and aboveground utilities)	Does not affect opportunity to provide streetscape amenities and urban design improvements compared with existing conditions.	Most opportunity - Realignment creates opportunity to provide desirable Right-Of-Way width, and thus streetscape/urban design/active transportation possibilities.	Least opportunity of all solutions – widening of Lakeshore Rd. West requires a reduction in boulevard widths, thus limited (if any) opportunities for streetscape/urban design.	Moderate opportunity - Laneway creates some opportunity to provide streetscape/urban design possibilities, however, laneways are typically intended for urban access routes, thus potential less vegetation/boulevard.	Lesser opportunity - solution seeks to implement improvements with minimal changes to existing Lakeshore.
<b>Overall Recommendation from Socio-Economic Perspective</b>						
<b>Solution 2</b> is preferred from the socio-economic perspective as while it has property impacts to an adjacent business, has a lesser impact to the surrounding neighbourhood and the least impact to business/residential access and accessibility within the area. Doing Nothing and Solution 1 are the least preferred.						
<b>Cultural Environment</b>	Impacts to Archaeological Resources (Impact to known archeological features or areas of archeological potential)	Will not impact known archaeological features or areas of archaeological potential.	Stage 1 Assessment determined that there are no previously registered archaeological sites located within 1 km of the Study Area, and the area surrounding the intersections is considered disturbed with no archeological potential. Turtle creek and its banks are areas of archeological potential; however, no solutions impact these areas.			
	Impacts to Cultural Heritage Features (Impacts to CHRs or CHLs within study area)	Will not impact cultural heritage resources or cultural heritage landscapes.	A Cultural Heritage Resource Assessment (CHRA) identified a total of seven (7) cultural heritage resources within and/or adjacent to the study area. Five (5) cultural heritage resources are listed on the Heritage Register for Mississauga (2020), one (1) of these resources is additionally included on the Ontario Heritage Trust's Places of Worship Inventory (the former Methodist Church located in the northeast quadrant of the Clarkson Road South intersection). All solutions avoid impacts to cultural heritage resources.			
	Opportunity to improve community cultural experience	Do not affect opportunity to improve community cultural experience compared with existing conditions.	Most Capacity - Realignment creates most potential space for vibrant main street experience and public realm facilities.	Least capacity to create vibrant main street experience and public realm facilities.	Moderate Capacity - Realignment creates space for public realm facilities.	Least capacity to create vibrant main street experience and public realm facilities.
<b>Overall Recommendation from Cultural Environment Perspective</b>						
<b>Solution 1</b> is preferred from a cultural environmental perspective as it creates the most potential space for vibrant public realm facilities, while also avoiding impacts to cultural heritage resources.						
<b>Natural Environment</b>	Impacts to Environmentally Sensitive Areas	No impacts to the Turtle Creek.	Slight impacts to the Turtle Creek woodlands: designated Significant Woodlands and Urban Natural Features (City of Mississauga, 2019).	No impacts to Turtle Creek.		
	Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	Will not impact wildlife, vegetation, aquatic species and habitat or Species at Risk.	Slight impacts to wooded area near Turtle Creek: potential Significant Wildlife Habitat for Northern Myotis, Little Brown Myotis and tri-coloured Bats.	No impacts to the woodlands.	Minor impacts to the wooded area near Turtle Creek: potential Significant Wildlife Habitat for Northern Myotis, Little Brown Myotis and tri-coloured Bats.	No impacts to the woodlands.
	Provides Drainage, Stormwater	Will not change impervious area, therefore no impact to drainage,	Improvements will result in small increases in roadway imperviousness	The proposed intersection improvements will result in minimal	The proposed intersection improvements will result in minimal	The proposed intersection improvements will result in minimal increases in roadway



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	Management and Erosion Control Improvement Opportunities	stormwater management, or erosion control.	within the study area and impacts to the existing drainage conditions will be negligible and not require any SWM. Solution will have impacts on the stormwater flow paths but will not have any effect on the total existing drainage area, nor the final outlet location of the stormwater drainage. The proposed improvements will be within the CVC regulation limits and will require approval of the CVC. The changes to the existing culvert crossing Turtle Creek under Clarkson Road North, will require a hydraulic analysis on the structure to ensure no increases to water surface elevation occur upstream of the structure during major storm events.	increases in roadway imperviousness within the study area and impacts to the existing drainage conditions will be negligible and not require any SWM. Solution 2 and 4 will not have any effect on the stormwater flow paths, total existing drainage area, nor the final outlet location of the stormwater drainage.	increases in roadway imperviousness within the study area and impacts to the existing drainage conditions will be negligible and not require any SWM. Solution will have impacts on the stormwater flow paths but will not have any effect on the total existing drainage area, nor the final outlet location of the stormwater drainage. The proposed improvements will be within the CVC regulation limits and will require approval of the CVC.	imperviousness within the study area and impacts to the existing drainage conditions will be negligible and not require any SWM. Solution 2 and 4 will not have any effect on the stormwater flow paths, total existing drainage area, nor the final outlet location of the stormwater drainage.
	Climate Change Impacts and ability to reduce Greenhouse Gas Emissions	This solution will not affect climate change impacts or greenhouse gas emissions.	This solution provides more opportunity for streetscaping / planting, thus helping to reduce greenhouse gases and construction of new drainage infrastructure can be designed to accommodate climate change.	No opportunity for streetscaping / planting, as boulevard widths are narrowed.	Laneway creates some opportunity to provide streetscape/urban design possibilities, however, laneways are typically intended for urban access routes, thus potential less vegetation/boulevard.	Lesser opportunity for streetscaping / planting (same limited opportunity as existing).
<b>Overall Recommendation from Natural Environment Perspective</b>						
		<b>Solution 2</b> is preferred from the Natural Environment perspective as it has no impact to Turtle Creek or its associated wooded area, will not have large impacts to surrounding stormwater and drainage area, and maintain the existing potential of streetscaping/planting on Lakeshore Road West. Solution 1 and 3 are less preferred as they have edge impacts to the wooded area of Turtle Creek, with Solution 3 being the least preferred as it also has limited opportunity for planting on the laneway.				
<b>Transportation</b>	Safety for all road corridor users (pedestrian, transit passenger, cyclist, auto)	Will not improve operations or provide additional safety benefits to road corridor users.	All solutions improve existing features and provide safety benefits to all users. It is noted that while Solution 1 (Realign Clarkson Road North) provides improved geometry and the singular intersection, minimum curves are used to help limit impacts on the Turtle Creek natural corridor.			
	Addresses congestion and accommodates future travel demand	Will not address congestion or accommodate future travel demand.	Traffic analysis identified all solutions provide similar overall operational benefits at the intersections in future years (Level of Service (LOS) of A/B (AM/PM)) when compared to the ‘Do Nothing’ alternative (LOS A/E (AM/PM)). The solutions are also similar in their improvements to travel time along Lakeshore Road West.			
	Promotes a high-quality pedestrian experience	Will not provide an opportunity to improve crossings to promote a high-quality pedestrian experience.	All solutions promote a high-quality pedestrian experience and present opportunity to improve existing crossings.			

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	Promotes a high-quality cycling experience	Will not provide an opportunity to reduce conflict points or provide enhanced cycling facilities.	Reduces number of conflict points with vehicles along Lakeshore Road. Solution provides opportunity to design in consideration for future cycling facilities on Clarkson Road – an objective of the City.	Does not provide opportunities to design in consideration for future cycling facilities on Clarkson Road – an objective of the City.		
	Accommodates existing and planned transit services	Will not impact existing transit stops and can accommodate future transit needs.	Will not impact existing transit stops and can accommodate future transit needs.	Limited space on Lakeshore Road for transit stop improvements.	Will not impact existing transit stops and can accommodate future transit needs.	Limited space on Lakeshore Road for transit stop improvements.
	Commercial / Business Access Impacts	Will not impact commercial / business accesses.	Solution will have the least impacts to surrounding commercial accesses.	Raised median restricts movement however, enforces existing right-in / right-out for gas station.	While the raised median enforces right-in / right-out along Lakeshore Road, the laneway can mitigate impacts as it provides another access point.	Most impact to accesses as the raised median enforces right-in / right-out along Lakeshore Road and inhibit access to businesses on Clarkson Road South.
	Improves Network Connectivity	Will not impact existing network connectivity.	Improves connectivity by having a singular intersection.	Retains existing connectivity by keeping all movements.	Slight impact to connectivity – while all movements are retained, use of the laneway is not typical and would not meet driver expectation.	Most impact to connectivity as prohibits two movements from/to Clarkson Road South – results in an increase of 5 minutes to travel time of residents / users of Clarkson Road South.
	Accommodates Commercial Goods Movement	Will not improve commercial goods movement on Lakeshore Road.	All solutions allow goods movement and improve congestion on Lakeshore Road.			
<b>Overall Recommendation from Transportation Perspective</b>		○	●	◐	◑	○
		<b>Solution 1</b> is the preferred from the Transportation perspective as the use of a singular intersection provides the most effective network improvement and the new roadway can be designed to accommodate future active transportation needs. All solutions provide similar operational improvements. Solution 4 is least preferred from this perspective due to its impacts to local commercial/business access and travel time delays for residents / users of Clarkson Road South .				
<b>Engineering, Cost, Construction Complexity and Implementation</b>	Ease of construction including Staging and Traffic Disruption	Will not require staging or disrupt traffic.	Majority of new construction is off-line from the existing network.	Least construction required, however, would require some staging and traffic disruption on Lakeshore Road.	Majority of new construction is off-line from the existing network.	Least construction required, however, would require some staging and traffic disruption on Lakeshore Road.
	Potential for Utility Relocations	Will not require relocation of utilities.	Relocation of all utilities on Clarkson Road North required with realignment of road. Major utilities impacted along Lakeshore Road.	Some impacts to utilities due to the widening required. Major utilities impacted along Lakeshore Road.	Some impacts to utilities due to the extent of improvements required. Laneway provides some opportunity for utilities. Major utilities impacted along Lakeshore Road.	Least impacts to utilities as improvements kept within existing pavement width. Major utilities impacted along Lakeshore Road.
	Estimated Cost (including estimated property cost) (nearest \$0.1M)	\$0	\$7.2M	\$0.5M	\$4.9M	\$0.2M
	Potential for Soil and Water Remediation	No potential for soil and water remediation.	Most potential - The gas station property will require at least a Phase II ESA as storage tanks are in use.	Some potential – while the Gas station is not displaced, Solution 2 and 3 require some property from the Gas Station for which the soils will have to be assessed.	Potential for unknown fill to have been used underneath the roadway.	

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			Potential for unknown fill to have been used underneath the roadway.			
	Operation/Maintenance Costs	No change to operation and maintenance costs .	Opportunity for lesser operation/maintenance costs in the future as roadway will be new. Solution also reduces number of intersections.	Slight increase as roadway will be slightly widened.	Greater operations/maintenance costs as a large section of new roadway is added, plus sidewalks to be constructed, and retains two intersections.	No change in the operation/maintenance costs as no new road is to be added.
<b>Overall Recommendation from Engineering, Cost, Construction Complexity and Implementation Perspective</b>						
		<b>Solution 4</b> is preferred from the Engineering, Cost, Construction Complexity and Implementation perspective as it costs the least, is easier to construct and avoids impacting the Gas Station and any potentially hazardous soils (while all other solutions impact the Gas Station property in some form). <b>Solution 1</b> is the least preferred due to its significant cost and high potential for soil remediation.				
<b>City Building</b>	Consistency with the City's Strategic Plans and Policies	Does not preclude the implementation of the City's strategic plans or policies.	Solution 1, 2 and 4 do not preclude the implementation of the City's strategic plans or policies.		Solution 3 follows the principles of the City's access management plan for the Clarkson Community Node (Official Plan, Chapter 14).	Solution 1, 2 and 4 do not preclude the implementation of the City's strategic plans or policies.
	Accommodates Existing and Planned Development	No impact to existing and future development.	Impacts existing development, however, new roadway and land severance promote future development.	No impact to existing and future development.	Impacts existing development, however laneway and severance promote future development.	No impact to existing and future development.
	Compatibility with parks, public spaces, and natural areas	No impact on parks, public spaces or natural areas.	Minor edge impacts to the Turtle Creek woodlands.	No impact on parks, public spaces or natural areas.	Minor impacts to the edge of the woodlands near Turtle Creek, however, laneway provides additional connection to areas of public interest.	No impact on parks, public spaces or natural areas.
<b>Overall Recommendation from City Building Perspective</b>						
		<b>Solution 3</b> is preferred from the City Building Perspective as it follow's the City's access management plan for the community of Clarkson per the Official Plan, the land severance and laneway would help promote future development and the laneway helps provide a further local connection to areas of public interest.				
<b>Overall Recommendation</b>		Overall, <b>Solution 2 and Solution 1 are identified as preferred.</b> <b>Solution 2 is identified as the Interim Preferred Solution</b> , as it provides improvements to safety and operations at a trade-off of either small or mitigable impacts, and it does not have a significant disadvantage unlike the other solutions. The solution is expected to address the needs of the intersections for the short and medium terms. <b>Solution 1 is identified as the Preferred Solution</b> , as it is the preferred from the transportation and cultural environment perspectives, as it will address the safety and operational needs of the intersections for the long term and better fulfil the future vision of the Clarkson community.				



### 3. SUMMARY TABLE

	Do Nothing	Solution 1	Solution 2	Solution 3	Solution 4
<b>Socio-Economic</b>	Least Preferred	Less Preferred	<b>More Preferred</b>	No Preference	Less Preferred
	<b>Solution 2</b> is preferred from the socio-economic perspective as while it has property impacts to an adjacent business, has a lesser impact to the surrounding neighbourhood and the least impact to business/residential access and accessibility within the area. Doing Nothing and Solution 1 are the least preferred.				
<b>Cultural Environment</b>	Least Preferred	<b>More Preferred</b>	Less Preferred	No Preference	Less Preferred
	<b>Solution 1</b> is preferred from a cultural environmental perspective as it creates the most space for vibrant public realm facilities, while also avoiding impacts to cultural heritage resources.				
<b>Natural Environment</b>	Least Preferred	No Preference	<b>More Preferred</b>	Less Preferred	No Preference
	<b>Solution 2</b> is preferred from the Natural Environment perspective as it has no impact to Turtle Creek or its associated wooded area, will not have large impacts to surrounding stormwater and drainage area, and maintain the existing potential of streetscaping/planting on Lakeshore Road West. Solution 1 and 3 are less preferred as they have edge impacts to the wooded area of Turtle Creek, with Solution 3 being the least preferred as it also has limited opportunity for planting on the laneway.				
<b>Transportation</b>	Least Preferred	<b>Most Preferred</b>	More Preferred	More Preferred	Least Preferred
	<b>Solution 1</b> is the preferred from the Transportation perspective as the use of a singular intersection provides the most effective network improvement and the new roadway can be designed to accommodate future active transportation needs. All solutions provide similar operational improvements. Solution 4 is least preferred from this perspective due to its impacts to local commercial/business access and travel time delays for residents / users of Clarkson Road South.				
<b>Engineering, Cost, Construction Complexity and Implementation</b>	Least Preferred	Less Preferred	More Preferred	No Preference	<b>Most Preferred</b>
	<b>Solution 4</b> is preferred from the Engineering, Cost, Construction Complexity and Implementation perspective as it costs the least, is easier to construct and avoids impacting the Gas Station and any potentially hazardous soils (while all other solutions impact the Gas Station property in some form). Solution 1 is the least preferred due to its significant cost and high potential for soil remediation.				
<b>City Building</b>	Least Preferred	More Preferred	No Preference	<b>Most Preferred</b>	No Preference
	<b>Solution 3</b> is preferred from the City Building Perspective as it follows the City's access management plan for the community of Clarkson per the Official Plan, the land severance and laneway would help promote future development and the laneway helps provide a further local connection to areas of public interest.				
<b>Overall Recommendation</b>	<p>Overall, <b>Solution 2 and Solution 1 are identified as preferred.</b></p> <p><b>Solution 2 is identified as the Interim Preferred Solution</b>, as it provides improvements to safety and operations at a trade-off of either small or mitigable impacts, and it does not have a significant disadvantage unlike the other solutions. The solution is expected to address the needs of the intersections for the short and medium terms.</p> <p><b>Solution 1 is identified as the Preferred Solution</b>, as it is the preferred from the transportation and cultural environment perspectives, as it will address the safety and operational needs of the intersections for the long term and better fulfil the future vision of the Clarkson community.</p>				