Appendix N
Evaluation of Alternative Designs & Preferred Design

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Evaluation of Alternative Design Concepts – October 2022 – Highway 401 to Steeles Avenue

	Evaluation Criteria	Alternative 1: Widen about the Centre Line	Alternative 2: Widen to the East	Alternative 3: Widen about the West
Transportation Planning	Meet Official Plan Objectives	• Preferred alignment will be designed to meet desired design criteria • Existing deficiencies along corridor will be addressed		
	Improves Mode Choice	• Provides opportunity for active transportation (ped/cycling connectivity) – sidewalks and MUP • Maintains current transit along segment		
		• No potential impact to existing bus stops	• No potential impact to existing bus stops	• Requires relocation of newly constructed Zum bus stop on west side
	Improves Congestion and Delays	• Improves congestion and delays by increasing capacity • Congestion mitigation provided by active transportation improvements		
	Improve Safety	• Improves safety through provision of additional vehicular, and active transportation facilities • Reduced collision potential with reduction in traffic congestion • High potential for improved cyclists and pedestrian safety due to active transportation improvements. Provision of separated active transportation facilities will reduce conflicts with motorists		
	Summary of Transportation	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
Engineering	Accommodates SWM and Drainage needs	• Requires realignment of ditch connecting to existing Hwy 407 ditch	• Requires realignment of ditch connecting to existing Hwy 407 ditch	• Minimal changes anticipated
	Minimizes utility relocations	• Potential to impact street lighting on both sides of roadway and cell-tower located just north of Highway 401 • Potential impact to cellular communications tower between E-N/S ramp and Meadowpine Blvd • Potential impact to TransCanada Pipeline	• Potential to impact street lighting on both sides of roadway and cell-tower located just north of Highway 401 • Potential impact to cellular communications tower between E-N/S ramp and Meadowpine Blvd • Potential impact to TransCanada Pipeline	• Potential to impact street lighting on both sides of roadway • Potential impact to TransCanada Pipeline
	Minimizes Constructability Complexity	• Requires reconstruction of Hwy 407 structure to accommodate widening to the west • Requires reconfiguration of Highway 401 S-Westbound ramp and W-N/S ramp	• Requires reconfiguration of Highway 401 S-Westbound ramp and W-N/S ramp	• Requires reconstruction of Hwy 407 structure to accommodate widening to the west • Potential to impact Highway 401 S-Westbound ramp
	Minimizes Disruption due to Construction	• Construction can be accommodated in phases		
	Summary of Engineering	**PREFERRED**	**MOST PREFERRED**	**PREFERRED**
Social-Cultural Environment	Minimizes Impacts to Air Quality / Climate Change	• Moderate improvement in air quality through reduced congestion • Active transportation connectivity can reduce dependence on single occupant vehicle and provide air quality improvements • Less reliance on single occupant vehicle can minimize effects on climate change • Opportunity to implement trees and Low Impact Development strategies as part of roadway improvements can improve resiliency to climate change		
	Minimizes Traffic Noise	• No noise sensitive receivers within segment		
	Minimize impact on property	• Potential to accommodate planned growth, however minor shifts in alignment to avoid constraints on east and west sides	• Reduced ability to accommodate planned growth, given identified utility constraints	• Impacts business' access on west side, just north of Highway 407
	Minimizes impact on access	• Minimizes impact to businesses on west, as located back from roadway • Encroaches businesses on east side	• Encroaches businesses on east side, as located in close proximity to roadway	• Minimal impact to businesses on west side, as located back from the roadway Encroaches businesses on east side
	Summary of Social & Cultural Heritage	**PREFERRED**	**PREFERRED**	**PREFERRED**

	Evaluation Criteria	Alternative 1: Widen about the Centre Line	Alternative 2: Widen to the East	Alternative 3: Widen about the West
Natural Environment	Protect vegetation, wildlife and aquatic habitat	• No natural heritage features within this segment		
	Summary of Natural Environment	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
Economic and Cost Effectiveness	Construction Value	• High - requires reconstruction of entire Hwy 407 structure to accommodate widening, costing millions	• Medium – requires extension of Hwy 407 structure to accommodate widening	• High - requires reconstruction of entire Hwy 407 structure to accommodate widening, costing millions
	Accommodate Existing / Planned Development and Growth / Land Use	• Reduced ability to accommodate planned growth, given identified hard constraints along corridor		
	Minimize Property Requirements	• Property required on west side to support Zum Station • Property required on east side between 401/Meadowvale Blvd	• Property required on east side between 401/Meadowvale Blvd	• Property required on west side to support Zum Station
	Summary of Economic & Costs	**PREFERRED**	**PREFERRED**	**PREFERRED**
	OVERALL	This Alternative achieves the transportation and social-cultural objectives of the Project, but results in significant costs to accommodate the reconstruction of the Hwy 407 structure, as well as impacts access to businesses on the west side.	This Alternative achieves the transportation, socio-cultural, and economic/cost objectives of the Project. Constraints from this alignment include the requirement to extend the Hwy 407 structure to the east to accommodate the widened roadway platform. In addition, there is the potential to require stormwater management adjustments and minimize grading to reduce impact on businesses on the east side.	This Alternative achieves the transportation objectives of the Project, but results in significant costs to accommodate the reconstruction of the Hwy 407 structure, as well as impacts access to businesses on the west side.
		PREFERRED	**MOST PREFERRED**	**PREFERRED**

Evaluation of Alternative Design Concepts – October 2022 – Steeles Avenue to 2km south of Embleton Road

	Evaluation Criteria	Alternative 1: Widen About the Centreline	Alternative 2: Widen to the East	Alternative 3: Widen to the West
Transportation	Meet Official Plan Objectives	• Preferred alignment will be designed to meet desired design criteria • Existing deficiencies along corridor will be addressed		
	Improves Mode Choice	• Provides opportunity for active transportation (ped/cycling connectivity) • Opportunity to extend transit northward along Winston Churchill Boulevard		
	Improves Congestion and Delays	• Improves congestion and delays by increasing capacity • Congestion mitigation provided by active transportation improvements		
	Improves Safety	• Improves safety through provision of additional vehicular, and active transportation facilities • Reduced collision potential with reduction in traffic congestion • High potential for improved cyclists and pedestrian safety due to active transportation improvements. Provision of separated active transportation facilities will reduce conflicts with motorists		
	Summary of Transportation	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
Engineering	Accommodates SWM and Drainage needs	• Requires new stormsewer installation northward to accommodate expanded roadway • Opportunity to introduce LIDs to address water quality	• Requires new stormsewer installation northward to accommodate expanded roadway • Opportunity to introduce LIDs to address water quality	• Requires new stormsewer installation northward to accommodate expanded roadway • Opportunity to introduce LIDs to address water quality
	Minimizes utility relocations / streetlights	• Potential to impact street lighting on both sides of roadway	• Potential to impact street lighting on east side of roadway	• Potential to impact street lighting on west side of roadway
	Minimizes Constructability Complexity	• Requires extension of Mullet Creek culvert • Minimal constructability issues		
	Minimizes Disruption due to Construction	• Construction can be accommodated in phases		
	Summary of Engineering	**PREFERRED**	**PREFERRED**	**PREFERRED**
Social-Cultural Environment	Minimizes Impacts to Air Quality / Climate Change	• Moderate improvement in air quality through reduced congestion • Active transportation connectivity can reduce dependence on single occupant vehicle and provide air quality improvements • Less reliance on single occupant vehicle can minimize effects on climate change • Opportunity to implement trees and Low Impact Development strategies as part of roadway improvements can improve resiliency to climate change		
	Minimizes Traffic Noise	• Noise levels anticipated to increase with future traffic growth and lanes in closer proximity to residential properties on the west side • Where warranted, noise mitigation to be implemented		
	Minimizes Impact on Property	• Impact to residential properties on the west side • Results in moderate impact to the Maple Lodge Farms parking and building located on the east side	• Significant impact to the Maple Lodge Farms parking and buildings located on the east side	• Significant impact to residential properties on the west side
	Improves Impacts on Access	• Impacts access residential properties on the west, and Maple Lodge Farms on the east	• Significant changes to access Maple Lodge Farms	• Significant modifications to access residential properties
	Minimizes Impacts to Archaeological Features	• Significant impact to the Mount Zion cemetery on the east side	• Significant impact to the Mount Zion cemetery located on the east side	• Moderate archaeological potential on the west side
	Minimizes Impacts to Cultural Heritage Resources	• Significant impact to cultural heritage resources associated with the cemetery	• Results in significant impact to cultural heritage resources associated with the cemetery	• No cultural heritage features impacted on the west side
	Summary of Social & Cultural Heritage	**PREFERRED**	**NOT PREFERRED**	**NOT PREFERRED**
Natural Environment	Avoids Designated Natural Areas	• No designated natural areas in this segment		

	Evaluation Criteria	Alternative 1: Widen About the Centreline	Alternative 2: Widen to the East	Alternative 3: Widen to the West
	Protects Vegetation, Wildlife and Aquatic Habitat	• Potential to impact mineral meadow marsh and fresh-moist marsh • Potential to impact fish and fish habitat associated with Mullet Creek	• Potential to impact Fresh-Moist Lowland Deciduous Forest on east side • Potential to impact fish and fish habitat associated with Mullet Creek	• Potential to impact mineral meadow marsh and fresh-moist marsh • Potential to impact fish and fish habitat associated with Mullet Creek
	Summary of Natural Environment	**PREFERRED**	**PREFERRED**	**PREFERRED**
Economic and Cost Effectiveness	Construction Value	• Less costs associated with rehabilitating existing roadway, with some additional extensions on both sides. Culvert extension on both sides increases construction costs.	• Requires reconstruction of full segment of roadway on east side • Culvert extension on one side leads to moderate construction costs	• Requires reconstruction of full segment of roadway on west side • Culvert extension on one side leads to moderate construction costs
	Accommodate Existing / Planned Development and Growth / Land Use	• Reduced ability to accommodate planned growth, given identified hard constraints along corridor • Minimal impact to businesses on west side and east sides • Impacts Maple Lodge Farms parking lot, as well as chicken facility on east side	• Reduced ability to accommodate planned growth, given identified hard constraints along corridor • Encroaches parking on east side, north of Highway 407 • Impacts Maple Lodge Farms parking lot, as well as chicken facility on east side	• Reduced ability to accommodate planned growth, given identified hard constraints along corridor • Minimizes impact to businesses on west side • No businesses on west side to be impacted
	Minimize Property Requirements	• Moderate residential properties impacted on both sides of the roadway	• Moderate residential and commercial property required on east side	• Significant residential property required; including full buy-outs
	Summary of Economic and Costs	**PREFERRED**	**PREFERRED**	**PREFERRED**
		This Alternative achieves the transportation, however has the potential for significant impacts to cultural heritage resources on the east side, as well as the Chicken Shoppe. There is a moderate cost associated with the number of properties that would be impacted.	This alternative is not preferred as a result of the significant impact to Mount Zion Cemetery on the east side, and the cultural heritage resources associated with it. It also has significant impacts on the access to Maple Lodge Farms, as well as impacts on parking and the building. The alternative results in significant impact on property acquisition.	This alternative has a significant impact on the residential properties on the west side, including several full buy-outs. This alternative would require reconstruction of a full segment of the roadway.
	OVERALL	**MOST PREFERRED** *It should be noted that this alternative was revisited following the Stage 2 AA for the Mount Zion Cemetery. Given the constraints within this segment, the Project Team mitigated the cross-section for a better fit, resulting in less property impacts to both residential and cultural resources along the corridor	**NOT PREFERRED**	**NOT PREFERRED**

Evaluation of Alternative Design Concepts – October 2022 – 2km south of Embleton Road to Embleton Road

	Evaluation Criteria	Alternative 1: Widen about the Centreline	Alternative 2: Widen to the East	Alternative 3: Widen to the West
Transportation Planning	Meet Official Plan Objectives	• Preferred alignment will be designed to meet desired design criteria • Existing deficiencies along corridor will be addressed		
	Improves Mode Choice	• Provides opportunity for active transportation (ped/cycling connectivity) • Opportunity to extend transit northward along Winston Churchill Blvd		
	Improves Congestion and Delays	• Improves congestion and delays by increasing capacity • Congestion mitigation provided by active transportation improvements		
	Improves Safety	• Improves safety through provision of additional vehicular, and active transportation facilities • Reduced collision potential with reduction in traffic congestion • High potential for improved cyclists and pedestrian safety due to active transportation improvements. Provision of separated active transportation facilities will reduce conflicts with motorists		
	Summary of Transportation	**MOST PREFERRED**	**MOST PREFERRED**	**MOST PREFERRED**
Engineering	Accommodates SWM and Drainage Needs	• Requires construction of stormsewers northward to accommodate expanded roadway • Requires realignment of Culvert 7, located near future Financial Drive • Requires realignment of Levi Creek North Branch to accommodate widened roadway and culvert extension • Opportunity to introduce LIDs to address water quality	• Requires construction of stormsewers northward to accommodate expanded roadway • Requires realignment of Culvert 7, located near future Financial Drive • Opportunity to introduce LIDs to address water quality	• Requires construction of stormsewers northward to accommodate expanded roadway • Requires realignment of Levi Creek North Branch to accommodate widened roadway and culvert extension • Opportunity to introduce LIDs to address water quality •
	Minimizes Utility Relocations	• Requires relocation of existing utility poles on both sides	• Requires relocation of existing utility poles on east side	• Requires relocation of existing utility poles on west side
	Minimizes Constructability Complexity	• Three-stages of construction • Requires realignment of Levi Creek North Branch	• Two-stages of construction • No realignment of Levi Creek required	• Two-stages of construction • Requires realignment of Levi Creek North Branch
	Minimizes Disruption Due to Construction	• Construction can be accommodated in phases		
	Summary of Engineering	**PREFERRED**	**PREFERRED**	**PREFERRED**
Social-Cultural Environment	Minimizes Impacts to Air Quality / Climate Change	• Moderate improvement in air quality through reduced congestion • Active transportation connectivity can reduce dependence on single occupant vehicle and provide air quality improvements • Less reliance on single occupant vehicle can minimize effects on climate change • Opportunity to implement tree plants in and Low Impact Development strategies as part of roadway improvements can improve resiliency to climate change		
	Minimizes Traffic Noise	• Noise levels anticipated to increase with future traffic growth and lanes in closer proximity to properties	• Noise levels anticipated to increase with future traffic growth and lanes in closer proximity to properties	• Noise levels anticipated to increase with future traffic growth and lanes in closer proximity to properties
	Minimizes Impact on Property	• Reduced impact to residential properties • No businesses located north of Maple Lodge Farms	• Significant impact to residential houses near roadway • No businesses located north of Maple Lodge Farms	• Significant impact to residential properties • No businesses located north of Maple Lodge Farms
	Minimizes Impact on Access	• Opportunity to improve access, via TWLTL	• Opportunity to improve access, via TWLTL	• Opportunity to improve access, via TWLTL
	Minimizes Impacts to Archaeological Resources	• Archaeological potential requiring Stage 2 on both sides of roadway	• Archaeological potential requiring Stage 2 on both sides of roadway	• Archaeological potential requiring Stage 2 on both sides of roadway

	Evaluation Criteria	Alternative 1: Widen about the Centreline	Alternative 2: Widen to the East	Alternative 3: Widen to the West
	Minimizes Impacts to Cultural Heritage Resources	• Moderate impact to cultural heritage resource on west side	• No impact to cultural heritage resources	• Significant impact to cultural heritage resource on west side
	Summary of Social & Cultural Heritage	**MOST PREFERRED**	**PREFERRED**	**PREFERRED**
Natural Environment	Avoids Vegetation	• Impacts dry-moist old meadow and mineral cultural thicket	• Impacts dry-moist old meadow and mineral cultural thicket	• No impact
	Minimizes impact to wildlife	• Minimal impact to wildlife	• Minimal impact to wildlife	• Moderate impact to wildlife
	Minimizes Aquatic Habitat	• Requires realignment of Levi Creek North • Potential to impact Redside Dace habitat associated with Levi Creek South and North	• Potential to impact Redside Dace habitat associated with Levi Creek South and North	• Requires realignment of Levi Creek North • Potential to impact Redside Dace habitat associated with Levi Creek South and North
	Summary of Natural Environment	**PREFERRED**	**PREFERRED**	**PREFERRED**
Economic and Cost Effectiveness	Construction Value	• Less costs associated with rehabilitating existing roadway, with some additional extensions on both sides. Culvert extension on both sides increases construction costs.	• Requires reconstruction of full segment of roadway on east side • Culvert extension on one side leads to moderate construction costs	• Requires reconstruction of full segment of roadway on west side • Culvert extension on one side leads to moderate construction costs
	Accommodate Existing / Planned Development and Growth / Land Use	• Ability to accommodate planned growth in the future		
	Minimize Property Requirements	• No businesses located north of Maple Lodge Farms		
	Summary of Economic and Cost Effectiveness	**PREFERRED**	**PREFERRED**	**PREFERRED**
		This Alternative was preferred for transportation and socio-economic. It has minimal impact on residential properties as impacts are equal on both sides. It has moderate impacts on cultural heritage resources on the west side and minimal impacts to the PSW associated with Levi Creek North and South. This alternative also allows for an easier transition to a two-lane roadway north of Embleton Road.	This alternative does not facilitate a transition to a narrowed cross-section north of Embleton Road. This alternative impacts one cultural heritage resource, wetlands associated with Levi Creek North and South and potential impact to fish and fish habitat located at Levi Creek North. It also results in significant impacts to residential houses located near the roadway.	This alternative does not facilitate a transition to a narrowed cross-section north of Embleton Road. This alternative results in minimal impacts to wetlands associated with Levi Creek North and South. It also has the potential to impact five cultural heritage resources.
	OVERALL	**MOST PREFERRED**	**NOT PREFERRED**	**NOT PREFERRED**

FOR INFORMATION
NOT FOR CONSTRUCTION

HATCH

SCALE
Horizontal
Vertical

WINSTON CHURCHILL BLVD.
Class Environmental Assesment
6 LANE ROAD WIDENING
FROM STA. 0+000 TO STA. 4+420

APRIL, 2023