

APPENDIX

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ROAD SAFETY REPORT



MEMO

TO: Daniel Nelliah, P.Eng.
FROM: Damir Bjelica, P.Eng.
SUBJECT: Road Safety Review of the Lagerfeld Drive extension
DATE: June 11, 2020

INTRODUCTION

As part of the Environmental Assessment for the East-West Connection (Lagerfeld Drive) (Mount Pleasant GO Station to West of Mississauga Road) in the City of Brampton, WSP has conducted a plan-base road safety review of the preferred alternative alignment for the Lagerfeld Drive extension developed by the project team. The purpose of this review was to identify the safety performance issues of the facility, and to determine the potential for the proposed geometry and operational features to contribute to collisions.

For the purpose of this review, the following plans and documents were supplied by the Project Team:

- Plan and profile of the preferred alignment in pdf, dated May 10, 2018
- Environmental Assessment Study, Phase 1 – Traffic Report, June 2015
- Preliminary Street Lighting Design in pdf, dated September 26, 2018 and March 2, 2020
- PDF file entitled “Future Access_Vertical Turning Sight Distance”
- PDF entitled “Proposed Future Access Turning Sight Distance_proposed SW”
- Cross section details (pdf files “Cross Sections 20200228”, and “Cross Sections - combined” dated October 2019)

STUDY AREA

The Lagerfeld Drive extension includes approximately 1.2 km of roadway with a four-lane urban cross-section, and a four-leg signalized intersection with Mississauga Road. For the purpose of this review, Lagerfeld Drive is assumed to be oriented East – West direction, and Mississauga Road to be oriented North – South direction. The study area extends approximately 700m to the west and 500m to the east of Mississauga Road. The study area is presented in figure below.

Figure 1: Study area



PLAN BASE SAFETY REVIEW

OVERVIEW

A plan-based safety review provided the foundation for our analysis. This process addresses road safety and operational issues only. We have not performed any detailed standards compliance checks, but have approached the analysis from the standpoint of an explicit, while not always quantitative, review of safety-related design and operations factors of interest and concern. The review is independent and formal processes, conducted by a team of road safety engineers who - based on their experience and expertise - provided opinions on the safety issues from the perspective of all road users.

Key elements considered in the course of our work included the following:

- Horizontal and vertical alignment
- Cross-section design
- Intersection configuration and interaction
- Traffic operations
- The accommodation of pedestrians and bicyclists
- Design consistency
- Human factors

FINDINGS

- The left-turn lanes at the Mississauga Road intersection have a negative offset. Therefore, sightlines for left-turning vehicles may be obstructed by vehicles in the opposing left-turn lane. This is of particular concern for the westbound approaching vehicles due to the presence of a horizontal curve west of the intersection. The provision of fully protected left-turn phases should be considered. Alternatively, the intersection reconfiguration to provide left-turn lanes with positive offsets should be examined.
- Both northbound and southbound approaches at the Mississauga Road intersection consist of a left-turn lane that varies in width. The width changes from 5.5 to 3.5 meters and a median island is introduced while approaching the intersection. This may impact driver expectation, and further result with undesirable driver behaviour and increased risk of collisions. Lane hatching or some form of delineation should be considered to improve the lane width consistency at these locations.
- The cross-section changes for the southbound lanes on Mississauga Road. The outside lane terminates shortly after the intersection with Lagerfeld Drive. This configuration may contribute to increased driver workload and risk of collisions. Relocating this lane-drop further downstream of the intersection is more desirable option. The provision of appropriate warning signs and lane designation markings should be considered to improve the positive guidance offered to drivers and to reduce the risk of last-minute lane change maneuvers. It is our understanding that future plans include widening of Mississauga Road to a 6-lane cross section and that safety concerns indicated above may be eliminated.
- We note that a continuous bicycle lane is provided along Lagerfeld Drive only. The lane configuration provided on the eastbound and the westbound approaches to the Mississauga Road intersection may result with a following conflicts between motor vehicles and bicycles:
 - Right-turn conflicts – due to vehicles making right turns across the bike lane
 - Left-turn conflicts – due to cyclists trying to change lanes and make left turns onto Mississauga Road

Mitigating measures should be considered to reduce the potential conflicts at the intersection. These may include the provision of additional delineation, installation of left-turn queue boxes or the provision of protected bicycle signal phase. The MTO Bikeways Design Manual¹ provides guidance on recommended signs and pavement markings for bicycle facilities.

¹ MTO Bikeways Design Manual, March 2014

- A future access is proposed at station 80+530 in close proximity to the intersection with Creditview Road located to the east. Vehicles turning from this access may encounter limited turning sightlines due to the presence of horizontal curvature. This is of particular concern for vehicles making left turns, as they must cross two lanes and a median. Also, due to the potential for high traffic volumes on Lagerfeld Drive, drivers turning from this access may experience increased delay. As a result, frustrated drivers may select gaps in oncoming traffic that are less than desirable. This may contribute to an increased risk of higher severity collision types (turning and angle collisions) at this location.

A review of the available turning sight distance at the proposed access was conducted by the WSP design team using the following values:

- Right turn: Minimum 130 m turning sight distance consistent with 70 km/h design speed.
- Left-turn: Minimum 130 m turning sight distance consistent with 60 km/h design speed.

The road safety team has identified the following concerns with this approach:

- It is our understanding that posted speed of 50 km/h is proposed along the facility. The 130m value used for left-turns is a minimum value for such conditions and is based on a vehicle turning left onto a two-lane two-way roadway. At the proposed access, left turning vehicles will be crossing two lanes and a median. As a result, the gap value used to determine the required left-turning sight distance should be adjusted as necessary to reflect the proposed conditions.
- Turning sightlines at the proposed access appear to be limited by a transformer to the west and a proposed building to the east.

The Modification to the proposed design should be considered to ensure sightline requirements are achieved. If the available sightlines can not be improved, potential countermeasures may include:

- The provision of advanced warning signage
 - The implementation of left-turn restrictions
 - The used of alternative intersection traffic control such as traffic signal or roundabout
- The Preliminary Street Lighting Design plans does not indicate direct illumination of the Mississauga Road intersection. However, after discussion with members of the design team, it is our understanding that light fixtures will be installed on the proposed traffic signal poles and that the appropriate levels of illumination will be provided at this location.
 - A review of the cross-section details provided by the design team, indicates that several roadside elements proposed along the facility may be located within the required clear zone and may present a roadside hazard for errant vehicles. Examples of such roadside hazards include: large trees, utilities and light poles, retaining walls, and steep embankment slopes.

A detailed review of specific roadside elements should be conducted, and opportunities to remove or relocate hazards beyond the required clear zone should be examined. If relocation is not practical, the hazards should be made traversable (i.e provide frangible bases for light poles), or assessed for barrier need.

It is our understanding that a posted speed of 50 km/h (60 km/h design speed) is proposed for this facility, and the expected AADT ranges from 8,000 to 13,000. The 2017 MTO's Roadside Design Manual suggests a 5 m clear zone for these conditions. This value is consistent with the 4.5 m to 5 m clear zone guidance offered in the 2017 TAC Guide.

However, Chapter 7 of the 2017 TAC Guide also notes the following:

In general, the guidelines influencing the Clear Zone design domain presented in this Chapter are intended for use on rural highways, urban and rural freeways, and urban expressways, where speeds are generally higher (greater than 70 km/h) and vehicles are operating under free flow conditions. However, for arterials and other non-controlled roadways in an urban environment, rights-of-way are typically narrower. In many cases,

establishing a Clear Zone using the guidance in this section is not practical and sometimes not desirable from the perspective of street character and context.... As a result, a secondary goal should be to identify and treat critical urban roadside locations.

In addition:

Roadside barriers may be warranted in urban situations if there is a potential of vehicles leaving the roadway at a specific location and that the cumulative consequences of those departures outweigh the cumulative consequences of effects with the barrier. The AASHTO RSAP toolset can be used to conduct a comparative analysis.

- The plans reviewed in the course of our work provide limited details on the extension of Lagerfeld Drive further west of the study area limit. Therefore, we have not provided comments on this segment of the design. It is our understanding that this extension is subject of a future study and development plans.