

Road Safety Assessment of Powerline Road between Wayne Gretzky Parkway and East City Limits (East of Coulbeck Road)

City of Brantford

60705629

May 2023



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City of Brantford

May 8, 2023

Project #
60705629

Subject: Road Safety Assessment of Powerline Road between Wayne Gretzky Parkway and East City Limits (East of Coulbeck Road)

Dear Mr. Smith,

This report presents the data and methodology used in undertaking the subject work assignment as well as the respective findings and recommendations.

Sincerely,
AECOM Canada Ltd.

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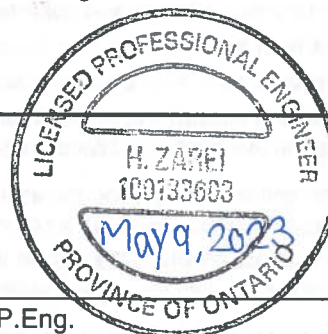


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Revision History

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1	May 8, 2023	Hossein Zarei	Addressed the comments received from the City on the May 3, 2023 version of the report.

Distribution List

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City of Brantford

Road Safety Assessment of Powerline Road between Wayne Gretzky Parkway and East City Limits (East of Coulbeck Road)

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1. Introduction

1.1 Study Background

In February 2023, the City of Brantford (i.e., the City) Council provided direction to staff to conduct various traffic studies with a focus on road user safety, speeding, streetlighting, pedestrian facilities, traffic control and traffic calming on the above-noted stretch of Powerline Road and report back to the City's Vision Zero Road Safety Committee in the second quarter of 2023. The Council direction was given in the wake of some concerns raised by Brantwood Park area residents regarding vehicle speeding on Powerline Road between Wayne Gretzky Parkway and the east limit of Brantford (i.e., east of Coulbeck Road) as well as concerns over safety of pedestrians (including children) crossing the section of Powerline Road at and in the vicinity of the Brantwood Park Road.

1.2 Project Description and Objectives

AECOM Canada Limited (i.e., AECOM) was retained by the City in March 2023 to undertake a road safety assessment of Powerline Road between Wayne Gretzky Parkway and the east City limit (i.e., east of Coulbeck Road). As per Section 5 (Specifications) of the City's Request for Quotation (RFQ), as part of the scope of work, AECOM was tasked to also undertake the following studies:

- Conduct turning movement counts at the intersections of Powerline Road / Brantwood Park Road and Powerline Road / Coulbeck Road on a typical day during morning peak period, mid-day period, and afternoon peak period,
- Collect automatic traffic recorder (ATR) data, including vehicular speed measurements for three (3) days, 24 hours per day,
- Undertake warrant analysis to assess needs / justification for conversion of the intersections of Powerline Road / Brantwood Park Road and Powerline Road / Coulbeck Road to either a signalized intersection, roundabout, and / or an all-way stop-controlled intersection at the two above-noted intersections as well as provision of a "controlled" pedestrian crossing facility across Powerline Road at the Brantwood Park Road intersection,
- Conduct a descriptive analysis of the historical collisions reported to occur within the most recent five (5) years,
- Assess need for provision of streetlighting on the following two mid-block sections of Powerline Road:
 - Between Wayne Gretzky Parkway and Brantwood Park Road, and
 - Between Brantwood Park Road and Coulbeck Road.

The objective of the study is to conduct a thorough and comprehensive road safety assessment, generally as per the Transportation Association of Canada's (TAC's) Canadian Guide for In-service Road Safety Reviews, of the above-noted stretch of Powerline Road with the aim of identifying potential road safety issues and recommending effective and context-specific road safety countermeasures for the City's consideration.

1.3 Study Area

Figure 1 shows the satellite image of the Study Area from Google. It shows the intersections and mid-block sections on this approximately 1.2-km stretch of Powerline Road between Wayne Gretzky Parkway and the east City limit (i.e., east of Coulbeck Road).

Within the Study Area, Powerline Road operates as a two-way, two-lane roadway with a rural cross-section (i.e., no curb and gutter) and the speed limit of 60 km/h. Within the Study Area and as per the City's Official Plan (OP), Powerline Road is classified as a "major arterial road". Also, Powerline Trail runs parallel and on the south side of Powerline Road between Wayne Gretzky Parkway and Brantwood Park Road. However, there is no pedestrian facilities or designated cycling facility on the section of Powerline Road, east of Brantwood Park Road. In addition, within the Study Area, there is no "controlled" pedestrian crossing facility for pedestrians to cross Powerline Road.

Brantwood Park Road is a two-way, two-lane road with an urban cross-section and on-road bike lanes and sidewalks on both sides of the road. As per the City's OP, Brantwood Park Road is a "major collector road". The intersection of Powerline Road / Brantwood Park Road has a STOP sign to control vehicles on Brantwood Park Road approaching the intersection and there is no control device at the intersection for vehicles on Powerline Road

approaches (i.e., free flow). Note that Brantwood Farms is located on the north side of Powerline Road in the vicinity of the Brantwood Park Road intersection. Brantwood Farms has a store and an access driveway immediately to the west of the intersection. Pedestrians were reported to cross Powerline Road at the intersection between residential dwellings on the south side of Powerline Road and the Brantwood Farms store and seasonal community activities that are held in the farms.

Coulbeck Road is a two-way, two-lane road with an urban cross-section with sidewalks on both sides of the road. As per the City's OP, Coulbeck Road is a "local road". The intersection of Powerline Road and Coulbeck Road is a three-legged intersection and in terms of intersection traffic control devices, there is only a STOP sign on the Coulbeck Road approach to the intersection.



Figure 1: Study Area

2. Approach / Methodology

The following sub-sections show the tasks undertaken in a sequential order as part of the study.

2.1 Segmentation of Study Area

The Study Area was broken down into a total of four (4) "basic" road elements, i.e., intersections and mid-block sections. Subsequently, each "basic" road element has been assigned a unique Location ID. **Figure 2** shows the Study Area "basic" road elements and their assigned Location IDs.



Figure 2: Intersections and Mid-block Sections of the Study Area and Respective Location IDs

2.2 Data Collection and Review

The following data items pertaining to the Study Area were obtained from the City:

- The most recent collision data: the collision data pertaining to the period from January 1, 2018, through December 31, 2022. Refer to **Appendix “A”** for the collision database showing key characteristics of the historical collisions,
- The most recent available automatic traffic recorder (ATR) data for the two sections of Powerline Road between Wayne Gretzky Parkway and Brantwood Park Road and between Brantwood Park Road and Coulbeck Road from 12:00AM on Tuesday, November 1, 2022, through 11:59PM on Wednesday, November 2, 2022. The available ATR data are shown in **Appendix “B”**. The ATR data include hourly vehicle volumes, classifications, and speed data separately for each direction of travel (i.e., eastbound, and westbound directions of travel),
- The following historical turning movement counts (TMCs) at the intersection of Powerline Road and Brantwood Park Road during the morning peak period, mid-day period, and afternoon peak period on a typical weekday in every 15-minute intervals:
 - Thursday, October 2, 2003, from 8:00AM to 10:00AM, from 11:00AM to 2:00PM, and from 3:00PM to 6:00PM,
 - Thursday, March 31, 2005, from 7:30AM to 9:30AM, from 11:00AM to 2:00PM, and from 3:00PM to 6:00PM,
 - Tuesday, February 27, 2018, from 7:30AM to 10:30AM, from 11:30AM to 1:30PM, and from 3:00PM to 6:00PM,
 - Tuesday, July 6, 2021, from 7:30AM to 10:30AM, from 11:30AM to 1:30PM, and from 3:00PM to 6:00PM, and
 - Tuesday, January 10, 2023, from 7:30AM to 10:30AM, from 11:30AM to 1:30PM, and from 3:00PM to 6:00PM,
- The TMCs at the intersection of Powerline Road and Coulbeck Road during the morning peak period (i.e., from 7:30AM to 10:30AM), mid-day period (i.e., from 11:30AM to 1:30PM), and afternoon peak period (i.e., from 3:00PM to 6:00PM) on Wednesday, February 1, 2023. The historical TMC data for the two intersections are also presented in **Appendix “B”**.

At the City’s request, Ontario Traffic Inc. (OTI), on behalf of AECOM, also collected the following additional traffic data in spring of 2023. These additional traffic data are presented in **Appendix “C”**.

- The ATR data for the section of Powerline Road between Brantwood Park Road and Coulbeck Road from 12:00AM on Tuesday, April 11, 2023, through 11:59PM on Thursday, April 13, 2023. The ATR data include hourly vehicle volumes, classifications, and speed data in 15-minute intervals and separately for each direction of travel (i.e., eastbound, and westbound directions of travel), and
- The TMCs at the intersection of Powerline Road and Coulbeck Road and the intersection of Powerline Road and Coulbeck Road during the morning peak period (i.e., from 7:00AM to 9:00AM), mid-day period (i.e., from 11:00AM to 2:00PM), and afternoon peak period (i.e., from 3:00PM to 6:00PM) on Wednesday, April 12, 2023.

2.3 Descriptive Analysis of Data

2.3.1 Traffic Volumes, Speeds, Patterns, and Composition

The above-noted traffic data were analyzed to identify notable patterns and composition of vehicular traffic volumes. The traffic data analysis findings are presented in **Section 3.1**. The traffic data analysis findings revealed peak directions of travel and volumes during both the AM and PM peak hours, directional splits of traffic volumes between the eastbound and westbound directions of travel, percentage of trucks, and 85th-percentile speeds, among others.

2.3.2 Collision Patterns and Spatial Distribution

The five-year historical collision data were reviewed and analyzed to identify the locations with relatively high frequency of collisions between January 1, 2018, and December 31, 2022. Note that all the collisions records shown in the collision database, even those categorized as “non-reportable”, were included in the collision analysis. The collision analysis findings show the notable patterns in terms of various collision characteristics location, time and day, and lighting condition, among others. The collision analysis findings are presented in **Section 3.2**.

2.4 Conduct Detailed Field Investigations / Walkthroughs and Preparation of a Photo Log

On Thursday, April 6, 2023, members of the AECOM project team walked the entire section of Powerline Road within the Study Area and conducted a detailed investigation of the Study Area from the road safety perspective. As part of the detailed investigations, the AECOM project team:

- Recorded the general information on all the Study Area intersections, mid-block road sections, and the Brantford Farms access driveways such as lane configuration, traffic control devices, and active transportation facilities, etc.,
- Identified potential road safety-related issues with respect to road geometry (e.g., insufficient sightlines, roadside hazards, sub-standard lane widths, etc.),
- Searched for visual indications of recent collisions (e.g., skid marks or debris on pavement, etc.),
- Identified issues pertaining to traffic control devices (e.g., missing / faded signs and pavement markings, / misplaced signs, etc.),
- Searched for human factors related issues (e.g., any situation that could result in violation of road user expectancies, etc.), and
- Took photos to record / document the observed potential road safety related issues.

2.5 Warrant Analyses

The following warrant analyses were undertaken as part of the study. The warrant analysis findings are presented in **Section 3.3**.

- Traffic signal warrant analysis to assess needs / justification for conversion of the intersection of Powerline Road / Brantwood Park Road and the intersection of Powerline Road / Coulbeck Road to a signalized intersection. The traffic signal warrant analysis was conducted as per the guidelines provided in Ontario Traffic Manual (OTM) Book 12,

- Warrant analysis to assess needs / justification for conversion of the two above-noted intersections to an all-way stop-controlled intersection as per the guidelines provided in OTM Book 5,
- Left-turn warrant analysis to assess needs / justification for provision of let-turn lane(s) on Powerline Road at the two above-noted intersections. The left-turn warrant analysis was conducted as per the MTO's Geometric Design Standards for Ontario Highways,
- Warrant analysis to assess needs / justification for provision of a "controlled" pedestrian crossing facility across Powerline Road at the intersection of Powerline Road and Brantwood Park Road and to identify the most suitable type of "controlled" pedestrian crossing facility. This warrant analysis was conducted as per the guidelines provided in OTM Book 15, and
- Streetlighting warrant analysis to assess needs / justification for provision of streetlighting on the following two mid-block sections of Powerline Road. The streetlighting warrant analysis was conducted as per the TAC Guide for Design of Roadway Lighting.
 - Between Wayne Gretzky Parkway and Brantwood Park Road, and
 - Between Brantwood Park Road and Coulbeck Road.

2.6 Lines of Evidence Review and Identification of Road Safety Issues

After the completion of all the above-noted tasks such as the notable historical collision patterns, the warrant analysis findings, and the findings / observations from the detailed site investigation task, a "lines of evidence" exercise was undertaken. The "lines of evidence" exercise established potential links between the findings from all the above-noted analyses tasks and identified a long list of road safety-related issues as well as their potential causal factors.

2.7 Develop a List of Potential Road Safety Engineering Treatments

In the light of the findings from the "lines of evidence" exercise, a preliminary list of potential engineering treatments / countermeasures was developed. The potential engineering treatments / countermeasures were aimed at eliminating and / or mitigating the identified road safety issues.

3. Analysis Findings and Recommendations

3.1 Traffic Volumes, Speeds, Patterns, and Composition

The findings from the descriptive analysis of the most recent traffic counts are as follows:

Vehicular Traffic Volumes, Patterns, and Composition:

- The average daily vehicular traffic volumes on the studied stretch of Powerline Road are estimated at approximately 4,300 vehicles per day on the section between Wayne Gretzky Parkway and Brantwood Park Road and at approximately 1,800 vehicles per day on the section between Brantwood Park road and Coulbeck Road. Also, the daily traffic volumes are almost equally distributed between the two directions of travel.
- On the mid-block section of Powerline Road between Wayne Gretzky Parkway and Brantwood Park Road, the peak hour volume in the eastbound direction of travel is approximately 280 vehicles and recorded between 4:00PM and 5:00PM. In the westbound direction of travel, the peak hour volume is approximately 190 vehicles and recorded between 8:00AM and 9:00AM.
- The traffic volumes during afternoon hours (i.e., from 12:00PM through 11:59PM) are notably greater than the traffic volumes during the morning hours (i.e., from 12:00AM through 11:59AM) as unlike the westbound direction of travel that has noticeable morning and afternoon peak hours, the eastbound direction of travel only has an afternoon peak hour period which is between 3:00PM and 6:00PM.

- As per the historical traffic counts, almost 75% of vehicles travelling in the Study Area are “passenger vehicles”, 20% classified as other 2-axle 4-tire vehicles (e.g., minivans, pick-up trucks, etc.), and 5% are other types of vehicles, including trucks.

Vehicle Speed Measurements:

- A clear “speeding” issue was identified on the studied stretch of Powerline Road where 85th-percentile speeds were measured at between 76 and 79 km/h in both directions of travel, and on the sections both east and west of Brantwood Park Road where posted speed limit is 60 km/h.
- More than 80% of motorists were travelling at speeds higher than the posted speed of 60 km/h, and
- There were even a few vehicles travelling at 100 km/h or higher.

3.2 Collision Patterns and Spatial Distribution

There was a total of eleven (11) collisions reported to occur within the Study Area during the five-year period between January 1, 2018, and December 31, 2022.

During the noted five-year period, only one (1) of the total eleven (11) collisions (i.e., 9% of the total collisions) were reported as “severe” collisions and it was categorized as “non-fatal injury”; i.e., there was no fatal collision. The single “non-fatal injury” was reported to occur at the intersection of Powerline Road and Brantwood Park Road. The remaining 10 collisions were reported as either property-damage-only (PDO) or non-reportable. Note that as per the City Council report, dated February 28, 2023, there was also a recent collision where a young pedestrian was struck and injured by a vehicle while attempting to cross Powerline Road.

Other identified collision patterns are as follows:

- Most of the collisions (i.e., 7 out of total 11 collisions) were reported to occur at or in the vicinity of the intersection of Powerline Road and Brantwood Park Road. Out of those seven (7) collisions, three (3) involved a vehicle either entering or exiting via the access driveway of Brantwood Farms,
- Most of the collisions (i.e., 9 out of the total 11) were reported to occur when weather condition was “clear” – no precipitation or fog – and road surface condition was “dry”,
- In terms of lighting conditions, most of the collisions (i.e., 9 out of the total 11) were reported to occur at “daylight”, and
- Almost half of the collisions (i.e., 5 out of the total 11) were reported to occur on weekends which could be an indication that those were involved non-locals / unfamiliar drivers.

3.3 Warrant Analysis Findings

The summary of the warrant analysis findings are as follows:

- Neither of the two intersections of Powerline Road / Brantwood Park Road and Powerline Road / Coulbeck Road is warranted for signalization or conversion to an all-way stop-controlled intersection. The details on the traffic signal warrant analysis findings are presented in **Appendix “D”** and those pertaining to the conversion of the intersections to the all-way stop-controlled are presented in **Appendix “E”**,
- The provision of left-turn lane(s) was also not warranted in either of the two intersections. For details on the left-turn lane warrant analysis findings, refer to **Appendix “F”**. Note that for the warrant analysis, it is assumed that the design speed of Powerline Road is 80 km/h, i.e., 20 km/h over the posted speed of 60 km/h,
- The warrant analysis findings for provision of a “controlled” pedestrian crossing facility across Powerline Road at the intersection of Powerline Road and Brantwood Park Road justifies provision of a pedestrian cross-over (PXO) Level 2 Type “C” at the intersection and across Powerline Road, and
- Lastly, neither of the following two mid-block sections of Powerline Road was warranted for provision of streetlighting. Refer to **Appendix “G”**, for the detailed streetlighting warrant analysis findings. Note that the need for provision of nighttime illumination at the two intersections of Powerline Road / Brantwood Park Road and Powerline Road / Coulbeck Road were previously established by the City staff. At the time of the preparation of this report, the streetlighting design for the two intersections was underway.
 - Between Wayne Gretzky Parkway and Brantwood Park Road, and
 - Between Brantwood Park Road and Coulbeck Road.

3.4 Road Safety Issues and Recommended Countermeasures

For the City's consideration, **Appendix "H"** presents the "location-specific" study findings and recommendations. As presented in the noted appendix, the road safety assessment led to the identification of a series of potential road safety issues. Also, for each identified issue, at least one potential mitigation measure / countermeasure has been recommended.

4. Next Step

As the next step, the City will review the study findings and recommendations and subsequently, carry them or a selected group of them forward for planning and design before implementation in the field.

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