

## **APPENDIX D**

### **Safety Performance Review**

## **Safety Performance Review**

Courtneypark Drive East  
Class EA & Preliminary Design



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City of Mississauga

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April 22, 2015

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# SAFETY PERFORMANCE REVIEW

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## 1.0 Introduction & Background

Stantec Consulting Ltd. (Stantec) has been retained by the City of Mississauga to complete a Municipal Class Environmental Assessment (Class EA) and Preliminary Design for Courtneypark Drive East between Kennedy Road and Dixie Road, including the intersections (the study area). The following Safety Performance Review was undertaken as part of this Class EA with the purpose of establishing the safety performance of the Courtneypark Drive East corridor within the study area under existing conditions. This report is intended to be complementary to the Transportation & Traffic Analysis Report for this Class EA, also completed by Stantec.

Within the study area, Courtneypark Drive East is a four-lane urban arterial roadway. The adjacent land uses are primarily light-industrial and commercial/retail. Accordingly, heavy vehicles make up a significant portion of the traffic volumes in this area – up to 30% on through movements, and up to 40% of certain turning movements. Courtneypark Drive East experiences typical daily fluctuations in traffic volumes, with the AM peak period typically occurring from 7:30 – 8:30am and the PM peak period generally occurring from 4:30 – 5:30pm. From Kennedy Road to Tomken Road, turning movements are well controlled by the combination of a raised centre median; there is one commercial access (right-in/right-out) on the south side of Courtneypark Drive East, just east of Kennedy Road. Intersections are adequately-spaced and fully-signalized, with the exception of the west Highway 410 West Ramp Terminal intersection. Visibility is generally good, as both the horizontal and vertical alignments of Courtneypark Drive East are comprised of large-radius/flat curves as the roadway crosses Highway 410. East of Tomken Road, Courtneypark Drive East assumes a five-lane cross-section as the raised centre median is largely replaced by a painted median. Signalized intersections at Ordan Drive/Shawson Drive, Vipond Drive, and Ordan Drive facilitate north-south access within the study area, while full-moves access to several mid-block entrances is accommodated by the painted median. Again, visibility is generally good as the horizontal alignment is characterized by large-radius curves and there is no vertical curvature of any significance. A fully-signalized intersection is provided at Dixie Road.

The Safety Performance Review consisted of two parts. The first was a desktop review of available collision data to identify any trends or patterns that could suggest a safety or operational deficiency in the existing road or intersection configuration. The second part was a thorough analysis of factors affecting safety performance during a site visit by an experienced transportation engineer, which included a review of roadway/intersection configuration/geometry, visibility, roadside conditions, traffic operations, and adjacent land use.

The desktop review focused on the collision history and possible causes, the traffic volumes using intersections, and any obvious safety deficiencies that could be identified from ground photographs, aerial photographs, and/or topographic plans. The trends and patterns of collisions (and related potential causes) provide the reviewer with a list of concerns to consider during the site visit. These concerns were combined with issues observed during the site investigation for further analysis, and also considered in the overall context of the Transportation Analysis Report. An understanding of these issues provides the information needed for selecting traffic safety countermeasures.

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The office review was based on historical collision data and turning movement counts for each intersection within the study area. Historical collision data was provided by the City of Mississauga (years 2008-2013), the Region of Peel (years 2008-2012), and MTO (years 2008-2013). MTO indicated that the 2011-2013 data may be partially incomplete. Turning movement counts at each intersection in the Courtneypark Drive East corridor were conducted by Stantec on November 12, 2013.

Collision summary tables have been developed to isolate possible trends, such as collision type, location, time of day, and weather conditions. Specific findings for each intersection are provided in the following intersection-by-intersection summary.

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## 2.0 Collision Analysis & Field Review

### 2.1 MAJOR INTERSECTIONS

The average number of collisions per year and the most-recent turning movement counts were used to determine the average collision rate per year per Million Vehicle Entering (MVE) for each major intersection within the study area. A collision rate less than 1.0 collision per MVE per year is generally considered to be within the “expected” or “normal” operating range for a typical intersection.

#### 2.1.1 Courtneypark Drive East & Kennedy Road (signalized)

The number of collisions, year by year, is shown below:

**Table 1 – Courtneypark Drive East & Kennedy Road – Number of Collisions by Year**

Year	Number of Collisions
2008	12
2009	8
2010	17
2011	23
2012	16
2013	7
<b>Total</b>	<b>83</b>
<b>Average</b>	<b>13.8</b>

While the increased number collisions from 2010-2012 is a concern, the average six-year collision rate is **0.8** collisions per year per MVE, which is within the normal operating range. Of these collisions, 6% resulted in injury while the remainder were either property damage only or non-reportable. Most collisions (66%) occurred in clear weather conditions, with smaller percentages occurring in rain (17%) and snow (10%). The number of collisions by initial impact type is shown below:

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**Table 2 – Courtney Park Drive East & Kennedy Road – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	8%
Angle	11%
Rear-End	33%
Sideswipe	8%
Turning	23%
SMV	0%
Other	12%

A closer analysis of the collision data for this intersection indicates that most rear-end collisions are attributable to eastbound vehicles, while most turning collisions are attributable westbound vehicles. No further trends or patterns can be identified.

The radii of both the northwest and southwest corners of the intersection appear to be insufficient to accommodate a WB-20 truck completing either southbound or eastbound right-turn maneuvers, a condition that may be hazardous to nearby pedestrians. Specifically, a worn area that lacks vegetation is present behind the curb/adjacent to the sidewalk on the northwest corner. These movements were later simulated using swept-path turning simulation software (Transoft Solutions AutoTURN 8) and the geometry from the project base plan; the radii of both corners were found to be inadequate.

Other pedestrian hazards at this intersection include the steep grade of the curb ramps on the northwest, northeast, and southwest corners of the intersection. Each curb ramp is also missing a detectable warning surface (per AODA and the City of Mississauga Accessibility Design Handbook). Additionally, crosswalks on both the south and east approaches of the intersection provide access to the southeast corner and the adjacent MiWay transit stop; however, no connecting sidewalks (either north-south or east-west) are present.

The pole line on the north side of the intersection is located too close to the westbound Courtney Park Drive East edge of pavement and therefore encroaches on the required clear recovery zone (calculated based on 80km/hr design speed).

### 2.1.2 Courtney Park Drive East & Highway 410 West Ramp Terminal (unsignalized)

The number of collisions, year by year, is shown below. Note, the data provided by the City of Mississauga did not classify the Highway 410 ramp terminal collisions based on whether they occurred at the west or east (see section 2.1.3) intersection. Accordingly, Stantec's analysts have attempted to classify the data based on the parameters provided (i.e. turning movement direction, distance from adjacent intersection, etc.).

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**Table 3 – Courtenypark Drive East & Highway 410, West Terminal – Number of Collisions by Year**

Year	Number of Collisions
2008	3
2009	0
2010	0
2011	0
2012	0
2013	0
<b>Total</b>	<b>3</b>
<b>Average</b>	<b>0.5</b>

The average six-year collision rate corresponds to a rate of **0.5** collisions per year per MVE. All collisions were property damage only. Most collisions (67%) occurred in clear weather conditions, while the rest occurred during rain (33%). The number of collisions by initial impact type is shown below:

**Table 4 – Courtenypark Drive East & Highway 410 West Ramp Terminal – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	0%
Sideswipe	0%
Turning	100%
SMV	0%
Other	0%

The number of collisions at this intersection has remained consistently low over the past six years. No patterns or trends can be identified from the provided collision data.

The guiderail on the south side of Courtenypark Drive East, just east of the structure across Highway 410, is too short to adequately protect the adjacent embankment. Using the base plan provided by the City of Mississauga, Stantec analyzed the slope of this embankment and found that the upper portions of the slope (immediately adjacent to the guiderail) have a gradient of 2:1. According to the MTO Roadside Safety Manual, slopes steeper than 3:1 should be protected. Additionally, the existing steel beam guiderail utilizes a turned down end. The Roadside Safety Manual indicates that other end treatments (i.e. Extruder or Eccentric Loader) are preferred for use with this type of guiderail. Accordingly, Stantec recommends



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extending this guiderail to protect the full length-of-need for the embankment (as dictated by the Roadside Safety Manual) and upgrading the end treatment.

### 2.1.3 Courtneypark Drive East & Highway 410 East Ramp Terminal (signalized)

The number of collisions, year by year, is shown below. Note, similar to section 2.1.2, the data provided by the City of Mississauga did not classify the Highway 410 ramp terminal collisions based on whether they occurred at the west or east intersection. Accordingly, Stantec's analysts have attempted to classify the data based on the parameters provided (i.e. turning movement direction, distance from adjacent intersection, etc.).

**Table 5 – Courtneypark Drive East & Highway 410 East Ramp Terminal – Number of Collisions by Year**

Year	Number of Collisions
2008	6
2009	1
2010	3
2011	1
2012	4
2013	5
<b>Total</b>	<b>20</b>
<b>Average</b>	<b>3.3</b>

The average six-year collision rate corresponds to a rate of **0.3** collisions per year per MVE. Of these collisions, 30% resulted in injury while the remainder were classified as either property damage only (60%) or other (10%). Most collisions (55%) occurred in clear weather conditions, with rest occurring during rain (20%), snow (10%), fog (10%), or other weather conditions (5%). The number of collisions by initial impact type is shown below:

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**Table 6 – Courtney Park Drive East & Highway 410 East Ramp Terminal – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	10%
Angle	0%
Rear-End	60%
Sideswipe	15%
Turning	15%
SMV	0%
Other	0%

Though the number of collisions has varied from year to year, both the average collision rate and rate per MVE is low. The high proportion of rear-end collisions (60%) is indicative of congestion or queuing.

During the site visit, it was observed that the geometry of the northwest corner of the intersection may be insufficient to accommodate heavy vehicle turning movements. Accordingly, the southbound right-turn movement was simulated using swept-path turning simulation software and the geometry from the project base plan. As a result, the radius of the northwest corner was found to be insufficient to permit a WB-20 to successfully complete a southbound right-turn maneuver without tracking both over the curb and into the centre westbound through lane of Courtney Park Drive East. This finding is supported by the presence of visible tire marks on the pavement of Courtney Park Drive East that indicate similar off-tracking. Accordingly, Stantec recommends that the radius of the northwest corner be enlarged to fully accommodate heavy vehicle turning movements.

A third westbound through lane is added between the Highway 410 East and West Ramp Terminal intersections. At the Highway 410 East Ramp Terminal intersection, this lane begins as the receiving lane for southbound right-turns, while at the Highway 410 West Ramp Terminal intersection, this lane becomes an on-ramp to southbound Highway 410. The signage depicting usage of this lane is limited to a single sign on either side of the Courtney Park Drive East structure indicating that southbound Highway 410 is ahead and to the right. This limited signage could lead to motorists who are exiting southbound Highway 410 and proceeding to westbound Courtney Park Drive East being unaware that the lane actually becomes an on-ramp, potentially resulting in increased and/or poorly-timed weaving maneuvers. Stantec recommends installation of additional signage and pavement markings to clearly indicate lane use at this location.

The positioning of the Highway 410 East Ramp Terminal intersection itself may be confusing to some motorists. The “parclo” design is one of the most common interchange configurations used on suburban freeways in the GTA; therefore, motorists may be familiar with the location and positioning of freeway on- and off-ramps within this type of interchange. If this configuration were employed at the Courtney Park Drive East interchange, an on-ramp to northbound Highway 410 would typically be located in place of the existing off-ramp. Accordingly, this deviation from a likely familiar configuration may be a source of

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confusion – particularly under conditions in which visibility is poor. Depending on the Preferred Design Alternative selected as part of the Class EA, this expectation should be considered during the design of ramp terminal intersection for the interchange.

The guiderail on the north side of Courtneypark Drive East, between the northwest corner of the intersection and the structure across Highway 410, is too short to adequately protect the adjacent embankment. Using the base plan provided by the City of Mississauga, Stantec analyzed the slope of this embankment and found that the majority of the slope has a gradient of 3:1. According to the MTO Roadside Safety Manual, 3:1 slopes may warrant protection if the height of fill is greater than 3m; at this location, the height of fill is approximately 7m. Additionally, the existing steel beam guiderail utilizes a turned down end. The Roadside Safety Manual indicates that other end treatments (i.e. Extruder or Eccentric Loader) are preferred for use with this type of guiderail. Accordingly, Stantec recommends extending this guiderail to protect the full length-of-need for the embankment (as dictated by the Roadside Safety Manual) and upgrading the end treatment.

### 2.1.4 Courtneypark Drive East & Tomken Road (signalized)

The number of collisions, year by year, is shown below:

**Table 7 – Courtneypark Drive East & Tomken Road – Number of Collisions by Year**

Year	Number of Collisions
2008	10
2009	6
2010	13
2011	16
2012	11
2013	3
<b>Total</b>	<b>59</b>
<b>Average</b>	<b>9.8</b>

The average six-year collision rate corresponds to a rate of **0.5** collisions per year per MVE. Of these collisions, 8% resulted in injury while the remainder were classified as either property damage only, non-reportable, or other. Most collisions (75%) occurred in clear weather conditions, with smaller percentages occurring in snow (12%) or rain (8%). The number of collisions by initial impact type is shown below:

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**Table 8 – Courtenypark Drive East & Tomken Road – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	14%
Angle	12%
Rear-End	36%
Sideswipe	19%
Turning	15%
SMV	0%
Other	5%

No patterns or trends can be identified from the available collision data. It should be noted that detectable warning surfaces are not present on any of the crosswalks (per AODA and the City of Mississauga Accessibility Design Handbook).

### 2.1.5 Courtenypark Drive East & Dixie Road (signalized)

The number of collisions, year by year, is shown below:

**Table 9 – Courtenypark Drive East & Dixie Road – Number of Collisions by year**

Year	Number of Collisions
2008	17
2009	17
2010	22
2011	32
2012	23
2013	-
<b>Total</b>	<b>111</b>
<b>Average</b>	<b>18.5</b>

The average six-year collision rate corresponds to a rate of **0.9** collisions per year per MVE. Of these collisions, 1% were fatal and 13% resulted in injury, while remainder were classified as either property damage only or other. Most collisions (82%) occurred in clear weather conditions, with smaller percentages occurring in rain (10%) or snow (5%). The number of collisions by initial impact type is shown below:

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**Table 10 – Courteneypark Drive East & Dixie Road – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	1%
Angle	4%
Rear-End	39%
Sideswipe	28%
Turning	24%
SMV	5%
Other	0%

Regarding the higher proportion of sideswipe collisions, a closer analysis of the data for this intersection indicates that most of these collisions are attributable to northbound/southbound traffic; however, no further trends or patterns can be identified.

On the eastbound approach to the intersection, the median eastbound through lane converts to a left-turn lane (part of a double eastbound left-turn) with little advance warning. While two separate overhead sign structures are mounted on the raised centre median of Courteneypark Drive East and several pavement markings serve to show the change in lane designation, the first indicator to westbound motorists is located only 60m west of the intersection. It should be noted that an analysis of the collision data did not indicate an increased number of sideswipe collisions on this approach (which could be expected if motorists were “surprised” by a change in lane designation). However, given the high percentage of relatively slow-moving heavy vehicle traffic in the area, it is Stantec’s recommendation that improved signage be installed to ensure that motorists have sufficient opportunity for positioning in advance of the intersection.

Opposing mid-block approaches to private businesses both north/south of Courteneypark Drive East are located approximately 100m west of the Dixie Road intersection. These approaches intersect Courteneypark Drive East within the storage/taper portion of the previously-mentioned double eastbound left-turn lane. This condition could potentially result in conflict between westbound left-turning vehicles (either queued or moving) and vehicles that are entering/exiting either private approach. Accordingly, Stantec recommends completing the raised centre median between Dixie Road and Ordan Drive. While this would limit each private approach to right-in/right-out movements onto Courteneypark Drive East, both private businesses appear to have secondary all-directional approaches to Ordan Drive.

The line of concrete and wooden poles, beginning at the southeast corner of the Courteneypark Drive East & Dixie Road intersection and extending eastward along the south side of Courteneypark Drive East, is located less than 2m from the edge of pavement. These poles encroach on the required clear recovery zone (calculated based on 80km/hr design speed) and should be either relocated or protected.

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Despite the presence of a far-side MiWay transit stop on the southeast corner of the Dixie Road intersection, no sidewalk is present on the south side of Courtneypark Drive East. A full-width sidewalk should be provided at this location to accommodate pedestrians who wish to access the transit stop.

A line of trees is located on the west side of Dixie Road, approximately 75m north of the Courtneypark Drive East intersection. These trees impede the sightline of a pedestrian crossing the channelized southbound right-turn and should be trimmed back or removed.

A near-side bus stop located on the north side of Courtneypark Drive East, east of Dixie Road, is located more than 100m from the nearest crosswalk. This potentially encourages transit users to cross outside of the protected crosswalks at the Courtneypark Drive East & Dixie Road intersection. Stantec recommends that this transit stop be relocated further west, to promote crossing at the intersection.

Additionally, it should also be noted that detectable warning surfaces are not present on any of the crosswalks (per AODA and the City of Mississauga Accessibility Design Handbook).

### 2.2 MID-BLOCK LOCATIONS & MINOR INTERSECTIONS

The average number of collisions per year and the most-recent turning movement counts were used to determine the average collision rate per year per Million Vehicle Entering (MVE) for each section of Courtneypark Drive East both between major intersections and at each minor intersection within the study area. A collision rate less than 1.0 collision per MVE per year is generally considered to be within the “expected” or “normal” operating range for a given location.

Note, the City of Mississauga’s collision data for the section of Courtneypark Drive East, between Kennedy Road and Tomken Road, was divided into two groups – Kennedy Road to the Highway 410 West Ramp Terminal intersection, and the Highway 410 East Ramp Terminal intersection to Tomken Road. This means that no collision data was received for the section of Courtneypark Drive East between the Highway 410 East and West Ramp Terminal intersections; accordingly, this section has not been discussed in this report.



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### 2.2.1 Courtenypark Drive East, between Kennedy Road and Highway 410, West Ramp Terminal

The number of collisions, year by year, is shown below:

**Table 11 – Courtenypark Drive East, between Kennedy Road and Highway 410 West Terminal – Number of Collisions by Year**

Year	Number of Collisions
2008	1
2009	1
2010	1
2011	1
2012	3
2013	0
<b>Total</b>	<b>7</b>
<b>Average</b>	<b>1.2</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, 14% resulted in injury, while the remainder were classified as property damage only. The data reflects that all collisions occurred in clear weather conditions. The number of collisions by initial impact type is shown below:

**Table 12 – Courtenypark Drive East, between Kennedy Road and Highway 410 West Terminal – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	43%
Sideswipe	43%
Turning	14%
SMV	0%
Other	0%

While collisions increased in 2012, the overall rate has remained consistently low over the past 6 years. Available collision data indicates that the majority of these collisions were either rear-end or sideswipe, while a closer analysis reveals that nearly all of the vehicles involved were travelling eastbound. No other patterns or trends can be identified.

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No sidewalk or pathway has been provided along the north side of Courtneypark Drive East, despite the presence of existing, connecting sidewalks at both the northeast corner of the Courtneypark Drive East & Kennedy Road intersection (including a near-side MiWay transit stop) and on the north side of the Courtneypark Drive East structure across Highway 410. Stantec recommends the construction of a sidewalk on the north boulevard, in order to safely accommodate pedestrians in this section of Courtneypark Drive East.

Further, it should also be noted that cyclists and users of other modes of active transportation are forced to use either the roadway or the existing asphalt pathway on the south boulevard of Courtneypark Drive East, as no dedicated active transportation infrastructure has been provided. Given the high volume of heavy vehicle traffic in this area, Stantec recommends that dedicated active transportation facilities (i.e. a multi-use pathway) be provided in order to safely accommodate all road users in this section of Courtneypark Drive East.

### 2.2.2 Courtneypark Drive East, between Highway 410 East Ramp Terminal and Tomken Road

The number of collisions, year by year, is shown below:

**Table 13 – Courtneypark Drive East, between Highway 410 East Terminal and Tomken Road – Number of Collisions by Year**

Year	Number of Collisions
2008	0
2009	0
2010	0
2011	1
2012	0
2013	0
<b>Total</b>	<b>1</b>
<b>Average</b>	<b>0.2</b>

The average six-year collision rate corresponds to a rate of **0.0** collisions per year per MVE. The one collision that did occurred in clear weather conditions and resulted in property damage only. The number of collisions by initial impact type is shown below:



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**Table 14 – Courtnepark Drive East, between Highway 410 East Ramp Terminal and Tomken Road – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	100%
Sideswipe	0%
Turning	0%
SMV	0%
Other	0%

The number of collisions in this section of Courtnepark Drive East has remained consistently low over the past 6 years. No patterns or trends can be identified from the collision data.

The line of poles on the south side of Courtnepark Drive East (adjacent to the auxiliary eastbound right-turn lane at the Tomken Road intersection) is located within the asphalt pathway; these poles encroach on the clear recovery zone for Courtnepark Drive East and pose a hazard to pedestrians using the sidewalk. No sidewalk or pathway has been provided along the north side of Courtnepark Drive East, despite the presence of existing, connecting sidewalks at both the northwest corner of the Courtnepark Drive East & Tomken Road intersection, and on the side of the Courtnepark Drive East structure across Highway 410.

Additionally, cyclists and users of other modes of active transportation are forced to use either roadway or the existing asphalt pathway on the south boulevard, as no dedicated active transportation infrastructure has been provided in this section of Courtnepark Drive East (despite the presence of a connecting active transportation route on the west boulevard of Tomken Road). Dedicated active transportation facilities (i.e. a multi-use pathway) should be provided in order to safely accommodate all road users.

### 2.2.3 Courtnepark Drive East, between Tomken Road and Dixie Road

This section will also include the minor intersections at Courtnepark Drive East & Ordan Drive-Shawson Drive, Courtnepark Drive East & Vipond Drive, and Courtnepark Drive East & Ordan Drive. The number of collisions at each location, year by year, is shown below:

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**Table 15 – Courtneypark Drive East, between Tomken Road and Dixie Road – Number of Collisions by Year**

Year	Number of Collisions
2008	1
2009	0
2010	2
2011	1
2012	0
2013	0
<b>Total</b>	<b>4</b>
<b>Average</b>	<b>0.7</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, all were classified as property damage only. The data reflects that 50% of collisions occurred in clear weather conditions, while the remaining 50% occurred during rain. The number of collisions by initial impact type is shown below:

**Table 16 – Courtneypark Drive East, between Tomken Road and Dixie Road – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	50%
Sideswipe	25%
Turning	0%
SMV	25%
Other	0%

The average six-year collision rate for this section of Courtneypark Drive East is very low. The collision data does not reveal any identifiable trends or patterns.

In this section of Courtneypark Drive East, streetlighting is only present along the north side of the roadway. While the westbound lanes are adequately illuminated, this condition does not satisfy current City of Mississauga standards and may result in dark zones within the eastbound lanes. Therefore, streetlighting should be provided along the south side of Courtneypark Drive East in order to fully illuminate the roadway. Additionally, the existing streetlighting poles along the north side of Courtneypark Drive East encroach on the required clear recovery zone (based on 80km/hr design speed). Stantec recommends that these poles be relocated outside the clear recovery zone.

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It should also be noted that on the south side of Courtneypark Drive East, individual poles within the hydro pole line may encroach on the clear recovery zone at certain locations (though not to as great an extent as the poles on the north side). Depending on the Preferred Design Alternative selected, relocation or protection of the existing hydro poles on the north side should also be considered.

Further, it should also be noted that cyclists and users of other modes of active transportation are forced to use either the roadway or the existing sidewalk on the north boulevard of Courtneypark Drive East, as no dedicated active transportation infrastructure has been provided (despite the presence of a connecting active transportation route on the west boulevard of Tomken Road). Given the high volume of heavy vehicle traffic in this area, Stantec recommends that dedicated active transportation facilities (i.e. a multi-use pathway) be provided in order to safely accommodate all road users in this section of Courtneypark Drive East.

**Table 17 – Courtneypark Drive East & Ordan Drive/Shawson Drive – Number of Collisions by year**

Year	Number of Collisions
2008	0
2009	0
2010	2
2011	0
2012	1
2013	0
<b>Total</b>	<b>3</b>
<b>Average</b>	<b>0.5</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, all were classified as property damage only and occurred during clear weather conditions. The number of collisions by initial impact type is shown below:

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**Table 18 – Courtenypark Drive East & Ordan Drive/Shawson Drive – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	33%
Sideswipe	0%
Turning	0%
SMV	33%
Other	33%

The average six-year collision rate at the Courtenypark Drive East & Ordan Drive/Shawson Drive intersection is very low. The collision data does not reveal any identifiable trends or patterns.

It was observed that that intersection geometry may be insufficient to accommodate the heavy vehicle traffic using the intersection. Accordingly, all turning movements at this intersection were later simulated using swept-path turning simulation software. The radius of the northeast corner was found to be inadequate to permit a WB-20 to successfully complete an eastbound right-turn maneuver without the potential for conflict with a stopped vehicle on Ordan Drive/Shawson Drive or tracking over the curb, a condition which could be hazardous to pedestrians; the radius of the southwest corner was found to be inadequate for the same reason. Further, the radius of the southeast corner was found to be insufficient to allow a WB-20 to complete a northbound right-turn maneuver without tracking over curb. Stantec recommends correcting these geometric deficiencies.

It was noted that both curb ramps at this intersection lack detectable warning surfaces. It is recommended that detectable warning surfaces be retrofit into these existing curb ramps at this intersection and included in the construction of any new curb ramps, per AODA and the City of Mississauga Accessibility Design Handbook.

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**Table 19 – Courtnepark Drive East & Vipond Drive – Number of Collisions by Year**

Year	Number of Collisions
2008	0
2009	0
2010	2
2011	1
2012	1
2013	0
<b>Total</b>	<b>4</b>
<b>Average</b>	<b>0.7</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, all were classified as property damage only. The data reflects that 50% of collisions occurred in clear weather conditions, while the remaining 50% occurred during rain. The number of collisions by initial impact type is shown below:

**Table 20 – Courtnepark Drive East & Vipond Drive – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	50%
Angle	0%
Rear-End	50%
Sideswipe	0%
Turning	0%
SMV	0%
Other	0%

The average six-year collision rate at the Courtnepark Drive East & Vipond Drive intersection is very low. The collision data does not reveal any identifiable trends or patterns.

It was observed that that intersection geometry may be insufficient to accommodate the heavy vehicle traffic using the intersection. Accordingly, all turning movements at this intersection were later simulated using swept-path turning simulation software. The radius of the northeast corner was found to be inadequate to permit a WB-20 to successfully complete an eastbound right-turn maneuver without the potential for conflict with a stopped vehicle on Vipond Drive or tracking over the curb; the radius of the southwest corner was found to be inadequate for the same reason. Stantec recommends correcting these geometric deficiencies.

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It was also noted that a Canada Post mailbox is located on the northwest corner of the Courtneypark Drive East & Vipond Drive intersection, immediately adjacent to the back of curb. Due to its current position within the intersection, the mailbox is hazardous to both pedestrians who use it (there is no adjacent sidewalk) and Canada Post employees/vehicles who service it, and it therefore presents a hazard other motorists in the intersection as well. Stantec recommends that this mailbox be relocated.

Both curb ramps at this intersection lack detectable warning surfaces. It is recommended that detectable warning surfaces be retrofit into these existing curb ramps at this intersection and included in the construction of any new curb ramps, per AODA and the City of Mississauga Accessibility Design Handbook.

**Table 21 – Courtneypark Drive East & Ordan Drive – Number of Collisions by Year**

Year	Number of Collisions
2008	4
2009	2
2010	6
2011	3
2012	2
2013	0
<b>Total</b>	<b>17</b>
<b>Average</b>	<b>2.8</b>

The average six-year collision rate corresponds to a rate of **0.5** collisions per year per MVE. Of these collisions, 12% resulted in injury, while the remainder were property damage only. The data reflects that 65% of collisions occurred during clear weather conditions, while the remainder occurred during rain (24%) or snow/drifting snow (11%). The number of collisions at each location by initial impact type is shown below:

**Table 22 – Courtneypark Drive East & Ordan Drive – Number of Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	24%
Angle	35%
Rear-End	12%
Sideswipe	6%
Turning	12%
SMV	6%
Other	6%



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Although the Ordan Drive intersection has a higher average collision rate than the other minor intersection in this section of Courtney Drive East, the overall number of collisions has decreased over the past 4 years. No trends or patterns can be identified from the collision data. The higher proportion of angle collisions may result from left-turning vehicles using smaller gaps or the inter-green phase to complete their maneuver when operating around heavy vehicle traffic.

It was observed that intersection geometry may be insufficient to accommodate the heavy vehicle traffic using the intersection. Accordingly, all turning movements at this intersection were later simulated using swept-path turning simulation software. The radius of the northeast corner was found to be inadequate to permit a WB-20 to successfully complete an eastbound right-turn maneuver without the potential for conflict with a stopped vehicle on Ordan Drive or tracking over the curb; the radius of the southwest corner was found to be inadequate for the same reason. Stantec recommends correcting these geometric deficiencies.

It was noted that both curb ramps at this intersection lack detectable warning surfaces. It is recommended that detectable warning surfaces be retrofit into these existing curb ramps at this intersection and included in the construction of any new curb ramps, per AODA and the City of Mississauga Accessibility Design Handbook.

### 2.2.4 Highway 410 & Courtney Drive East interchange ramps

The average number of collisions per year and the most-recent turning movement counts were used to determine the average collision rate per year per Million Vehicle Entering (MVE) for each ramp within the Highway 410 & Courtney Drive East interchange. A collision rate less than 1.0 collision per MVE per year is generally considered to be within the “expected” or “normal” operating range for a given location.

**Table 23 – Ramp to southbound Highway 410, entrance from eastbound Courtney Drive East – Number of Collisions by Year**

Year	Number of Collisions
2008	0
2009	0
2010	1
2011	1
2012	0
2013	0
<b>Total</b>	<b>2</b>
<b>Average</b>	<b>0.3</b>

The average six-year collision rate corresponds to a rate of **0.3** collisions per year per MVE. Of these collisions, all were property damage only. The data reflects that 50% of collisions occurred in clear

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weather conditions, while the remaining 50% occurred during snow. The number of collisions by initial impact type is shown below:

**Table 24 – Ramp to southbound Highway 410, entrance from eastbound Courtney Park Drive East – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	0%
Sideswipe	0%
Turning	0%
SMV	100%
Other	0%

The average six-year collision rate on this portion of the ramp from Courtney Park Drive East to southbound Highway 410 is very low. The collision data does not reveal any identifiable trends or patterns.

**Table 25 – Ramp to southbound Highway 410, entrance from westbound Courtney Park Drive East – Number of Collisions by Year**

Year	Number of Collisions
2008	0
2009	0
2010	1
2011	0
2012	0
2013	0
<b>Total</b>	<b>1</b>
<b>Average</b>	<b>0.2</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, all were property damage only and occurred during clear weather conditions. The number of collisions by initial impact type is shown below:



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**Table 26 – Ramp to southbound Highway 410, entrance from westbound Courtney Park Drive East – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	100%
Sideswipe	0%
Turning	0%
SMV	0%
Other	0%

The average six-year collision rate on this portion of the ramp from Courtney Park Drive East to southbound Highway 410 is very low. The collision data does not reveal any identifiable trends or patterns.

**Table 27 – Ramp to southbound Highway 410, loop – Number of Collisions by Year**

Year	Number of Collisions
2008	1
2009	1
2010	0
2011	0
2012	0
2013	0
<b>Total</b>	<b>2</b>
<b>Average</b>	<b>0.3</b>

The average six-year collision rate corresponds to a rate of **0.1** collisions per year per MVE. Of these collisions, all were property damage only and occurred during either clear weather conditions or drifting snow. The number of collisions by initial impact type is shown below:

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**Table 28 – Ramp to southbound Highway 410, loop – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	0%
Sideswipe	100%
Turning	0%
SMV	0%
Other	0%

The average six-year collision rate on this portion of the ramp from Courtneypark Drive East to southbound Highway 410 is very low. The collision data does not reveal any identifiable trends or patterns.

It was observed that the loop ramp geometry may be insufficient to accommodate heavy vehicles. Accordingly, the ramp movements were simulated using swept-path turning simulation software. While the loop ramp could successfully accommodate a WB-20 entering Highway 410 from Courtneypark Drive East, any deviation from the optimum path could result in the vehicle tracking off the paved surface. Accordingly, Stantec recommends increasing the radius of this ramp to safely accommodate all heavy vehicle traffic.

**Table 29 – Ramp from northbound Highway 410 to Courtneypark Drive East – Number of Collisions by Year**

Year	Number of Collisions
2008	1
2009	0
2010	4
2011	3
2012	0
2013	0
<b>Total</b>	<b>8</b>
<b>Average</b>	<b>1.3</b>

The average six-year collision rate corresponds to a rate of **1.0** collisions per year per MVE. Of these collisions, 13% resulted in injury, while the remainder were property damage only. The majority of collisions (75%) occurred during clear weather conditions, while the remainder (25%) occurred during snow. The number of collisions by initial impact type is shown below:

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**Table 30 – Highway 410 northbound ramp to Courtneypark Drive East – Collisions by Initial Impact Type**

Year	Number of Collisions
Approaching	0%
Angle	0%
Rear-End	38%
Sideswipe	13%
Turning	0%
SMV	50%
Other	0%

The average six-year collision rate on this portion of the ramp to Courtneypark Drive East from northbound Highway 410 has decreased over the last 4 years. The collision data does not reveal any identifiable trends or patterns.

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### 3.0 Recommendations

Based on the observations and analysis described in section **Error! Reference source not found.**, tantec recommends the following:

- **Courtneypark Drive East & Kennedy Road**
  - enlarge radius of northeast/southeast corners to fully accommodate heavy vehicles;
  - construct pedestrian waiting area at southeast corner;
  - consider protecting/relocating the pole line north of Courtneypark Drive East;
- **Courtneypark Drive East & Highway 410, West Ramp Terminal (including ramps)**
  - extend guiderail south of Courtneypark Drive East and upgrade end treatment;
  - enlarge radius of loop ramp to southbound Highway 410 to fully accommodate heavy vehicles;
- **Courtneypark Drive East & Highway 410, East Ramp Terminal**
  - enlarge radius of northwest corner to fully accommodate heavy vehicles;
  - install additional signage/pavement markings to clearly indicate lane usage for north-most, westbound through lane on Courtneypark Drive East;
  - extend guiderail north of Courtneypark Drive East and upgrade end treatment;
  - consider reconfiguring interchange ramps/ramp terminal intersection to a more common configuration (depending on the Preferred Design Alternative selected);
- **Courtneypark Drive East, between Kennedy Road and Tomken Road**
  - construct sidewalk north of Courtneypark Drive East;
  - construct multi-use pathway south of Courtneypark Drive East;
  - consider protecting/relocating the hydro pole line south of Courtneypark Drive East, west of Tomken Road;
- **Courtneypark Drive East & Ordan Drive-Shawson Drive**
  - enlarge radius of northeast/southwest/southeast corners to fully accommodate heavy vehicles;
- **Courtneypark Drive East & Vipond Drive**

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- enlarge radius at northeast/southwest corners;
  - relocate mailbox on northwest corner;
- **Courtneypark Drive East & Ordan Drive**
  - enlarge radius at northeast/southwest corners;
- **Courtneypark Drive East, between Tomken Road and Dixie Road**
  - construct multi-use pathway south of Courtneypark Drive East;
  - install streetlighting south of Courtneypark Drive East to fully illuminate the roadway;
  - relocate/protect the line of streetlighting poles north of Courtneypark Drive East;
  - consider protecting/relocating any hydro poles south of Courtneypark Drive East that encroach on the clear recovery zone;
- **Courtneypark Drive East & Dixie Road**
  - install additional signage/pavement markings in advance of westbound left-turn;
  - complete raised median between Ordan Drive and Dixie Road and convert existing private approaches north/south of Courtneypark Drive East to right-in/right-out;
  - trim/remove trees/vegetation on west side of Dixie Road, north of Courtneypark Drive East to improve pedestrian sight distance;
  - relocate near-side transit stop on north side of Courtneypark Drive East, east of Dixie Road, closer to the intersection;
  - construct sidewalk south of Courtneypark Drive East, east of Dixie Road; and,
  - consider protecting/relocating the pole line south of Courtneypark Drive East, east of Dixie Road.

Stantec also recommends that all pedestrian facilities be upgraded to meet current standards, as per AODA and the City of Mississauga Accessibility Design Handbook.